



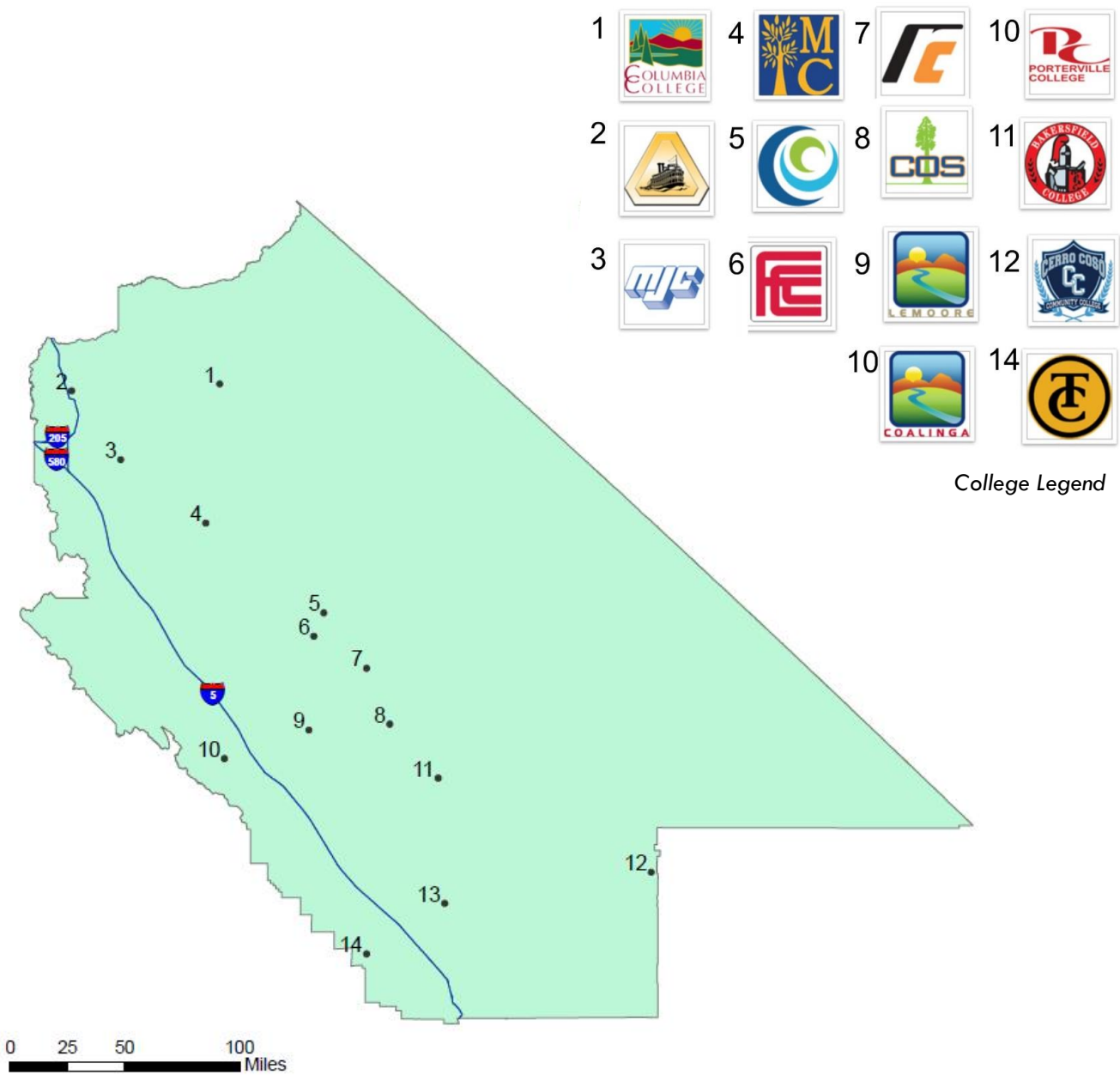
# LABOR MARKET OVERVIEW: CENTRAL VALLEY/ MOTHER LODGE REGION

Prepared by the  
Central Valley/  
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Center of Excellence

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**Exhibit 1: Map of community colleges in the Central Valley/ Mother Lode region**

# EXECUTIVE SUMMARY

This year, the Central Valley/Mother Lode Center of Excellence set out to study the top industries in the region and determine where future job growth will occur. This report contains a detailed examination of eleven sectors and one occupational grouping in the region, their top middle-skill jobs along with entry-level and median wages, community college program completions and a supply-and-demand workforce analysis for each sector/grouping. Population growth is expected to slow over the next five years in the region. The population currently totals more than 4.4 million residents and is projected to add more than 141,535 new residents by 2022, a growth rate of just over 3 percent. The 12 industry sectors studied employ more than 1.7 million workers and are projected to offer more than 128,000 new jobs by 2022. The study sought to answer a number of key questions:

**Which are the region's largest industries?** By employment size, retail, hospitality, tourism and entertainment has 338,179 jobs, followed by health care/social services, 243,382 jobs, and agriculture, 237,724 jobs. The health care industry is also projecting the largest overall expansion of 16% followed by logistics at 14%.

**Where will the jobs be?** Analysis of middle-skill job growth shows the business sector has the largest number of annual job openings, 24,410 followed by retail, hospitality, tourism and entertainment, 12,709 and health care, 12,459.

**Which occupations will offer the most job openings?**

- Heavy and tractor-trailer truck drivers, 3,793 annual openings;
- Office clerks (general), 3,784 annual openings;
- Teacher assistants, 2,701 annual openings;
- Secretaries and administration assistants (except legal, medical and executive), 2,510 annual openings;
- Customer service representatives, 2,352 annual openings;
- Registered nurses, 2,192 annual openings.

**Where are the largest supply gaps?** The largest undersupply of middle-skill workers is in the business sector with an annual shortage of 22,869 workers, followed by retail, hospitality, tourism and entertainment, 12,366 workers. The third largest shortage is in energy, construction and utilities, 10,056 workers. Health care is fourth with a projected gap of 9,783 workers annually.

**Which areas require strategic planning by regional community colleges?** Strategic planning is imperative to address the annual gap in the business; and energy, construction and utilities sectors. When global trade and retail (subsets of the business sector) are added, the total business percentage of the middle-skill gap jumps to 36%. The projected expansion for energy, construction and utilities accounts for 12% of the current annual gap followed by health care at 11%.

## 12 INDUSTRY SECTORS STUDIED

- AGRICULTURE, WATER AND ENVIRONMENTAL TECHNOLOGIES
- ADVANCED MANUFACTURING
- BUSINESS
- ENERGY, CONSTRUCTION AND UTILITIES
- EDUCATION
- GLOBAL TRADE
- HEALTH CARE
- ICT/DIGITAL MEDIA
- LOGISTICS
- MECHANICS AND WELDING
- PROTECTIVE SERVICES
- RETAIL, HOSPITALITY, TOURISM AND ENTERTAINMENT

# INTRODUCTION

The Center of Excellence conducted a labor market analysis focusing on the Central Valley/Mother Lode region. The community colleges that serve the region are shown in Exhibit 1. Eleven sectors and one occupational grouping were analyzed for this report, and their workforce demand was compared with community college supply. The following sections detail for each sector/grouping current employment numbers, projected occupational demand, entry-level and median wages, and three-year average supply of degrees and certificates from the regions community colleges. Each sector/grouping section contains a gap analysis. This report is organized by the following eleven sectors and one occupational grouping:

- Agriculture, water and environmental technologies;
- Advanced manufacturing;
- Business;
- Energy, construction and utilities (ECU);
- Education;
- Global trade;
- Health care;
- ICT/digital media;
- Logistics;
- Mechanics and welding;
- Protective services; and
- Retail, hospitality, tourism and entertainment.

# METHODOLOGY

Quantitative data collection and analysis were conducted for this report. Labor market data, particularly secondary data related to industry workforce demands and occupational employment, informed the report's findings. The North American Industry Classification System (NAICS) and the Standard Occupational Classification (SOC) System were used to source data. The criteria for occupations included in this report were determined by the Central Valley/Mother Lode Center of Excellence based on consortium discussions and recommendations. The occupational demand data include only those jobs directly related to the industry having 10 or more annual openings. Occupational projections include annual openings. Replacements can be determined by subtracting annual openings from overall job change. If the change is negative, then all the annual openings are replacements. For more information on the data sources employed by this study, please refer to Appendix A. Living wages were determined using the MIT Living Wage Calculator. Appendix B contains typical education level, work experience and on-the-job training required for each occupation discussed in the industry sections. Current Population Survey results are also included in Appendix B.

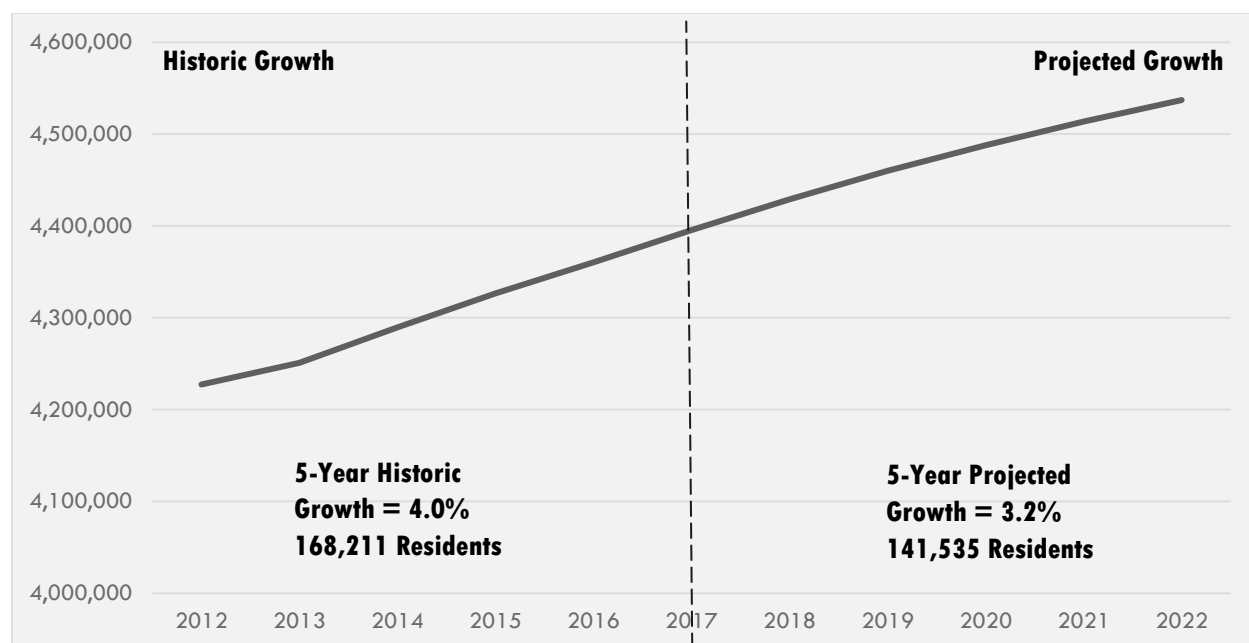


# REGIONAL OVERVIEW

## Residential Population

The Central Valley/Mother Lode region's population currently totals more than 4.4 million residents. By 2022, the region is projected to add more than 141,535 new residents (Exhibit 2). Over the last five years, the region grew by 4%. The projected growth rate of 3.2% is lower than in the previous five years. Each year, the region is expected to add from 23,000 to 30,700 new residents, with the most rapid growth occurring between 2019 and 2020.

**Exhibit 2: Population estimates and projections in the region**



## Demographics

Exhibit 3 shows projected changes in the Central Valley/Mother Lode region's demographics by 2022. Populations identifying as Hispanic are all projected to increase over the next five years. The number of individuals identifying as white, non-Hispanic is expected to decline by 47,844 by 2022.

The most rapid growth is projected to occur among individuals identifying as two or more races, Hispanic, 12%; native Hawaiian or Pacific Islander, non-Hispanic, 10%; native Hawaiian or Pacific Islander, Hispanic, 9%; and black Hispanic, 9%.

The most substantial population growth by number of residents is projected for:

- White, Hispanic residents, an increase of 132,159, 7%;
- Asian, non-Hispanic residents, an increase of 23,629, 7%; and
- Two or more races, non-Hispanic residents, an increase of 7,256, 12%.

The region's American Indian or Alaskan Native, non-Hispanic population is expected to decrease by 2%, a decline of 641 residents by 2022.

**Exhibit 3: Projected changes in race/ethnicity in the region**

RACE/ETHNICITY	2017	2022	CHANGE	% CHANGE
White, Non-Hispanic	1,521,002	1,473,158	(47,844)	(3%)
Black, Non-Hispanic	188,832	193,074	4,242	2%
American Indian or Alaskan Native, Non-Hispanic	29,685	29,044	(641)	(2%)
Asian, Non-Hispanic	325,673	349,302	23,629	7%
Native Hawaiian or Pacific Islander, Non-Hispanic	12,212	13,380	1,168	10%
Two or More Races, Non-Hispanic	95,706	102,657	6,951	7%
White, Hispanic	1,987,267	2,119,426	132,159	7%
Black, Hispanic	44,412	48,446	4,034	9%
American Indian or Alaskan Native, Hispanic	86,836	93,783	6,947	8%
Asian, Hispanic	36,010	39,004	2,994	8%
Native Hawaiian or Pacific Islander, Hispanic	7,193	7,832	639	9%
Two or More Races, Hispanic	60,771	68,027	7,256	12%
<b>TOTAL</b>	<b>4,395,597</b>	<b>4,537,132</b>	<b>141,535</b>	<b>3%</b>

For cohorts under age 20, the largest projected increase over the next five years will occurred in children under age 5, an 11% increase representing the addition of more than 38,000 children (Exhibit 4). There is a projected decrease in 5-9 age cohort, 5%, a decline of nearly 16,000.

**Exhibit 4: Projected change in age cohorts in the region, 2017-2022**

AGE COHORT	2017 POPULATION	2022 POPULATION	CHANGE	% CHANGE	2017 % OF COHORT
Under 5 years	339,520	377,617	38,097	11%	7.72%
5 to 9 years	350,583	334,585	(15,998)	(5%)	7.98%
10 to 14 years	343,859	354,698	10,839	3%	7.82%
15 to 19 years	323,357	330,343	6,986	2%	7.36%
20 to 24 years	315,673	306,542	(9,131)	(3%)	7.18%
25 to 29 years	333,841	316,608	(17,233)	(5%)	7.59%
30 to 34 years	309,331	334,835	25,504	8%	7.04%
35 to 39 years	285,932	303,605	17,673	6%	6.50%
40 to 44 years	259,793	278,912	19,119	7%	5.91%
45 to 49 years	255,940	248,616	(7,324)	(3%)	5.82%
50 to 54 years	256,216	244,026	(12,190)	(5%)	5.83%
55 to 59 years	254,700	242,605	(12,095)	(5%)	5.79%
60 to 64 years	222,924	239,081	16,157	7%	5.07%
65 to 69 years	189,619	208,482	18,863	10%	4.31%
70 to 74 years	135,326	168,232	32,906	24%	3.08%
75 to 79 years	93,098	113,279	20,181	22%	2.12%
80 to 84 years	62,357	70,648	8,291	13%	1.42%
85 years and over	63,529	64,416	887	1%	1.45%
<b>TOTAL</b>	<b>4,395,597</b>	<b>4,537,132</b>	<b>141,535</b>	<b>3%</b>	<b>100.00%</b>

When all age cohorts under the age of 9 are considered, there is a projected overall increase of 3% (Exhibit 5).

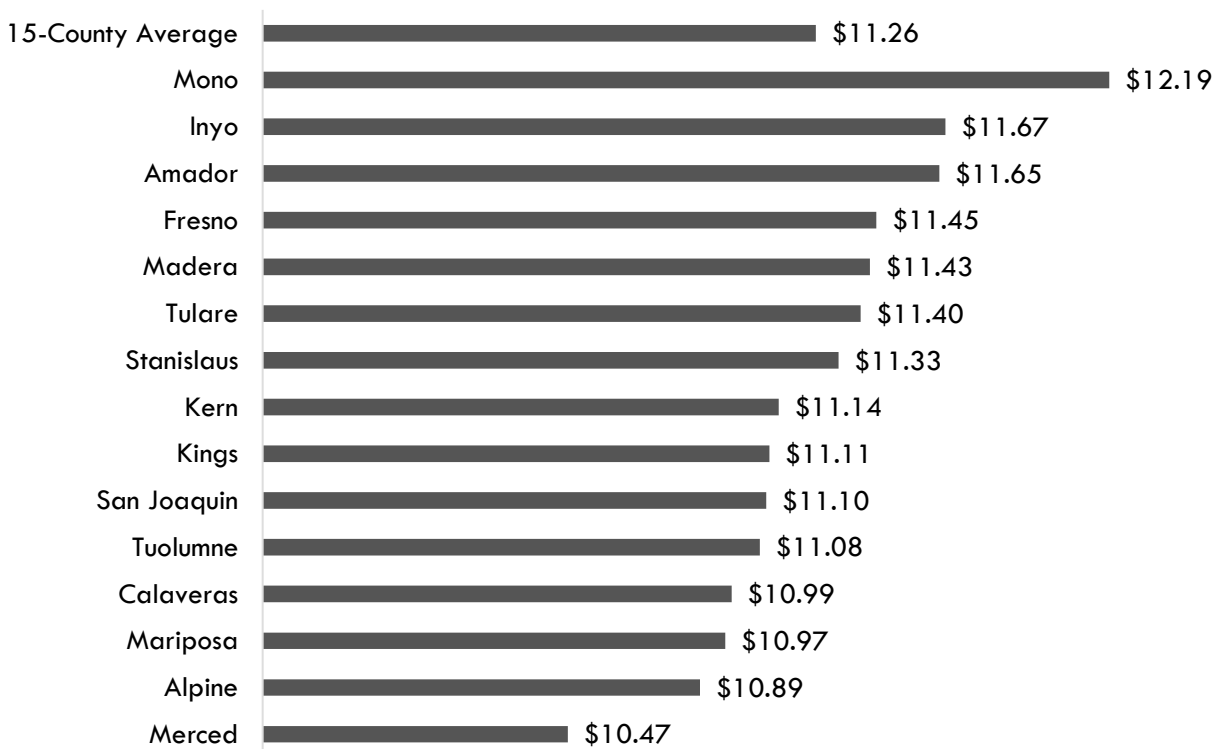
**Exhibit 5: Projected change in grouped age cohorts in the region, 2017-2022**

Age Range	2017	2022	Change	% Change
<=19	1,357,319	1,397,243	39,924	3%
20-24	315,673	306,542	(9,131)	(3%)
25-29	333,841	316,608	(17,233)	(5%)
30-34	309,331	334,835	25,504	8%
35-39	285,932	303,605	17,673	6%
40+	1,793,502	1,878,297	84,795	5%

## Living Wage Data

Exhibit 6 shows living wages for the region and by county. The average living wage for the region is \$11.26/hour for one adult. The highest living wage is attributed to Mono County, \$12.19/hour, while the lowest is Merced County, \$10.47/hour.

**Exhibit 6: Living wages for the Central Valley/Mother Lode region by county**



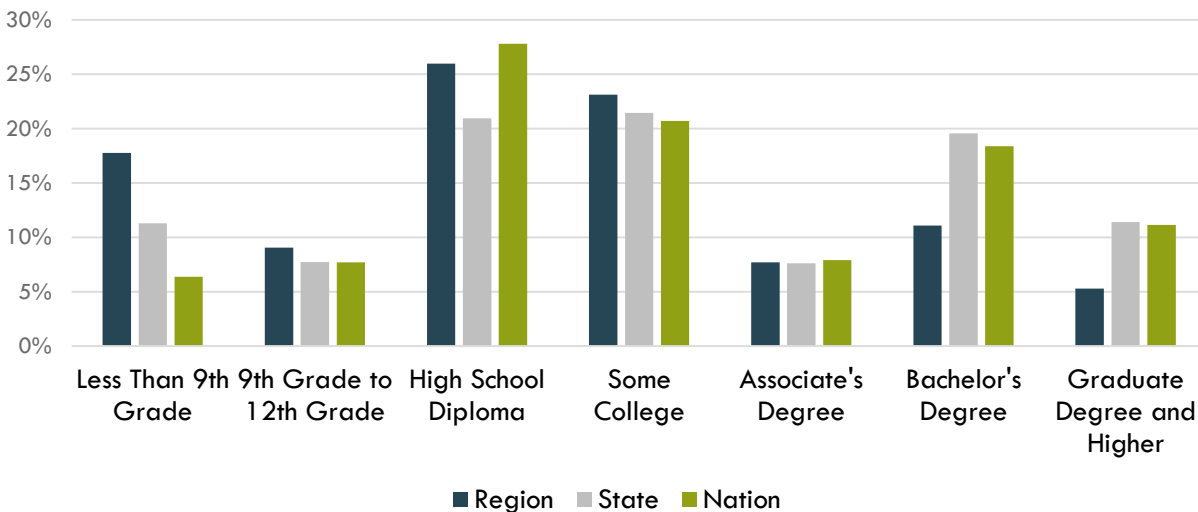
## Educational Attainment

The region trails both the nation and the state for bachelor's and graduate degree attainment, with only 11% of the adult population holding a bachelor's degree, compared to 20% statewide and 18% nationwide (Exhibit 7). Regarding associate degree attainment, the region, state and nation are the same, 8%. The region slightly leads the state in the percent of population that has completed some college or a



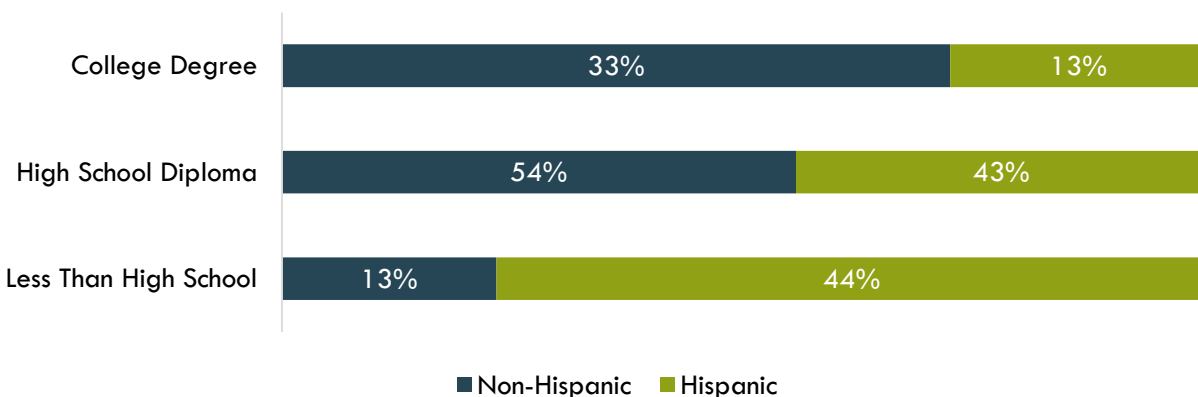
high school diploma. In the Central Valley/Mother Lode region, 23% of the population has completed some college, compared to 21% of the state. In the region, 26% of the population has obtained a high school diploma, which is greater than the state, 21% of the population. Compared to the state, a higher proportion of residents 25 years of age or older in the region have completed less than a 9<sup>th</sup> grade education and less than a 12<sup>th</sup> grade education, which indicates a greater need for adult education in the region.

**Exhibit 7: Educational attainment comparison of the nation, state and region**



Hispanic educational attainment in the Central Valley/Mother Lode region is lower than non-Hispanic educational attainment. Only 13% of the Hispanic population holds a college degree (associate degree or higher) compared to 33% of the non-Hispanic population (Exhibit 8). About 43% of Hispanic residents have completed high school, compared to 54% of non-Hispanic residents in the region. In addition, 44% of the Hispanic population did not complete high school, compared to 13% of the non-Hispanic population.

**Exhibit 8: 2017 Hispanic/non-Hispanic educational attainment in the region**



## Labor Force & Employment

The size and characteristics of a region's labor force are important considerations in workforce planning. Labor force, employment and unemployment data are based upon "place of residence" – where people live, regardless of where they work. Individuals who have more than one job are counted only once. These data elements differ from industry employment estimates that are "place-of-work" based – where the

employer/workplace is located, regardless of where the employee resides. (For terms and definitions, see Appendix A.)

Since 2012, the labor force in the Central Valley/Mother Lode region has grown by nearly 20,000 workers. Total employment increased by 136,320 workers (Exhibit 9). In 2012, more than 278,000 individuals were unemployed. By 2017, this number had declined by 136,320. Because total employment increased more than the labor force, the unemployment rate decreased from 15% in 2012 (compared to 10.4 statewide) to 8% in 2017 (compared to 4.8% statewide).

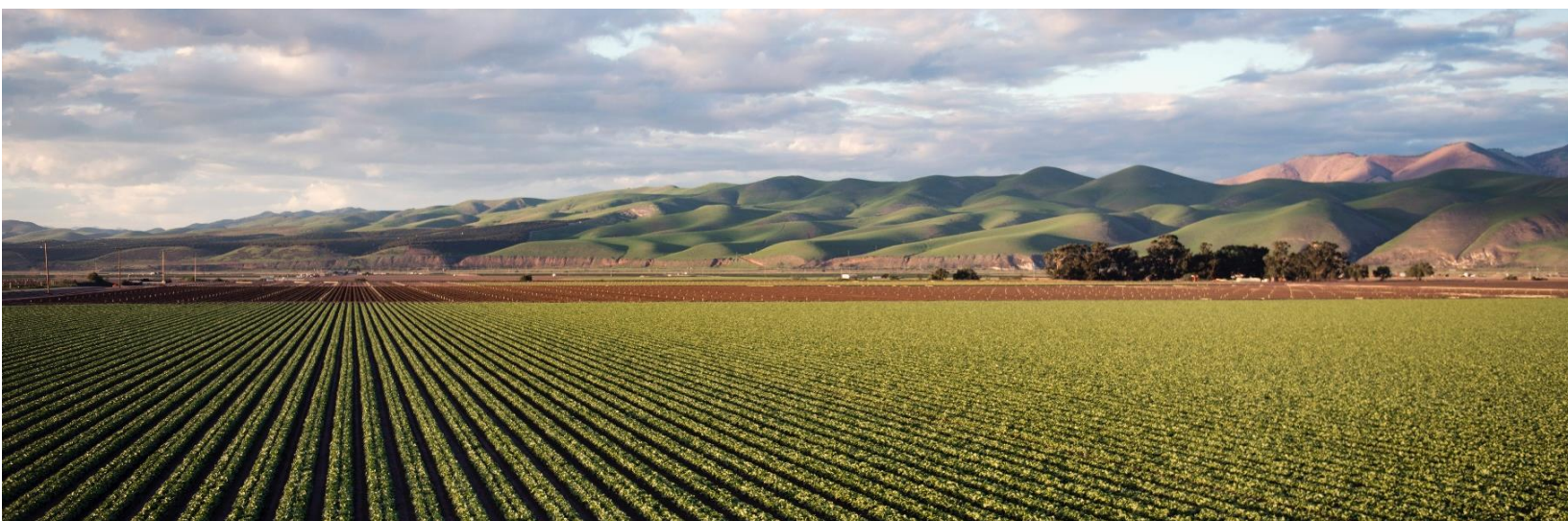
**Exhibit 9: Labor force size, employment and unemployment in the CV/ML region, 2012-2017**

METRIC	2012	2017	5-YEAR CHANGE
Labor Force	1,907,370	1,926,600	19,230
Employment	1,629,450	1,765,770	136,320
Unemployment	278,020	160,620	(117,400)
Unemployment Rate	15%	8%	(6%)

The five-year change in the region's unemployment rate mirrors the state's rate (Exhibit 10). Over the last five years, the labor force has added 788,200 workers, growing to more than 19 million. Unemployment has declined from 1.9 million to 918,900 statewide.

**Exhibit 10: Labor force size, employment and unemployment in the state, 2012-2017**

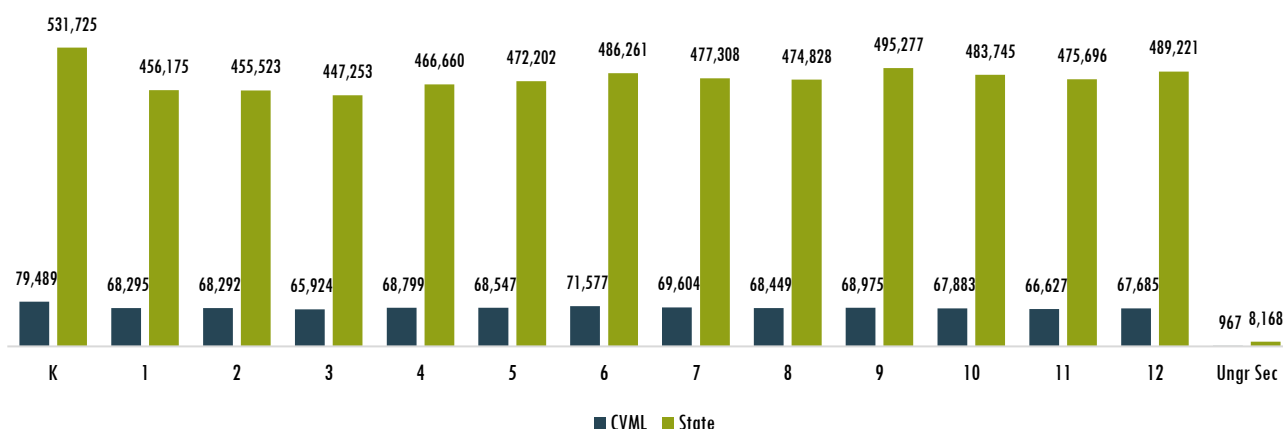
METRIC	2012	2017	5-YEAR CHANGE
Labor Force	18,523,800	19,312,000	788,200
Employment	16,602,700	18,393,100	1,790,400
Unemployment	1,921,100	918,900	(1,002,200)
Unemployment Rate	10.4%	4.8%	(6%)



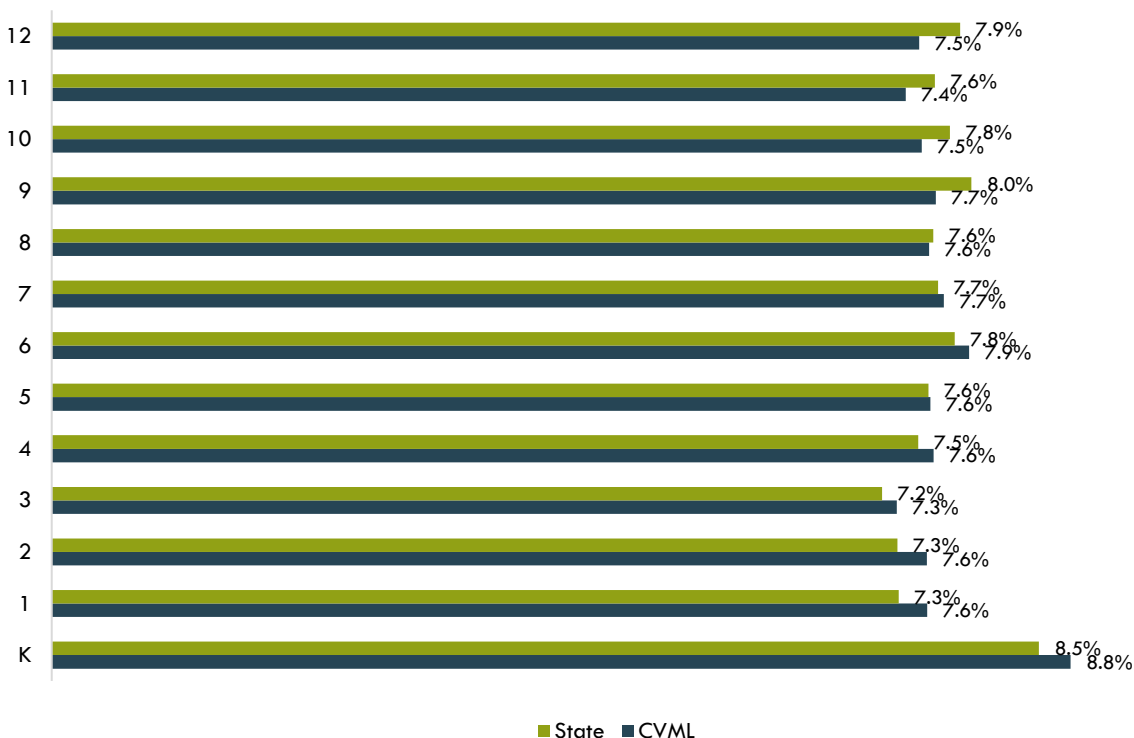
# K-12 ENROLLMENT & DEMOGRAPHICS

Student enrollment by grade level was analyzed to determine if community college enrollment will be affected in the coming years (Exhibits 11 and 12). The analysis shows that enrollment numbers are fairly consistent, hovering between 67,000 and 68,900 for most grade levels. There are two exceptions. Third-grade enrollment totals 65,900, the lowest level of enrollment for all grade levels analyzed. Sixth-grade enrollment totals 71,500, the highest enrollment number across all grade levels analyzed, except for kindergarten which totals approximately 79,500. However, kindergarten enrollment for the state and region tends to be much higher than other grades.

**Exhibit 11: Enrollment comparison by grade level in the region and the state, 2017-2018**



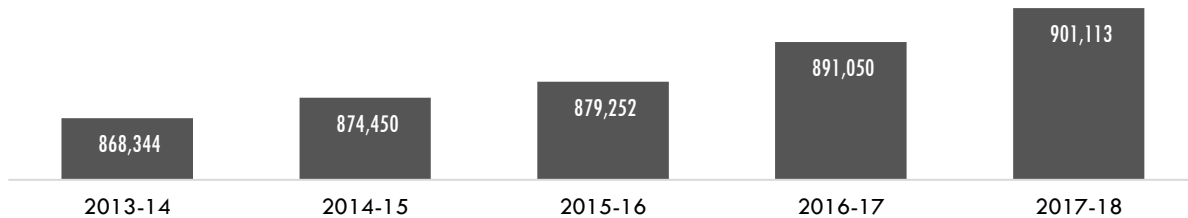
**Exhibit 12: Percentage enrollment by grade level in the region and the state, 2017-2018**



## Total K-12 Enrollment Over Time

Overall enrollment in the region has increased each year since the 2013-14 academic year (Exhibit 13). The highest enrollment numbers were recorded in the 2017-18, more than 901,000 students. This represents an increase of more than 33,000 students since the 2013-14 academic year.

**Exhibit 13: Total enrollment for grades K-12 in the region over the last five years**

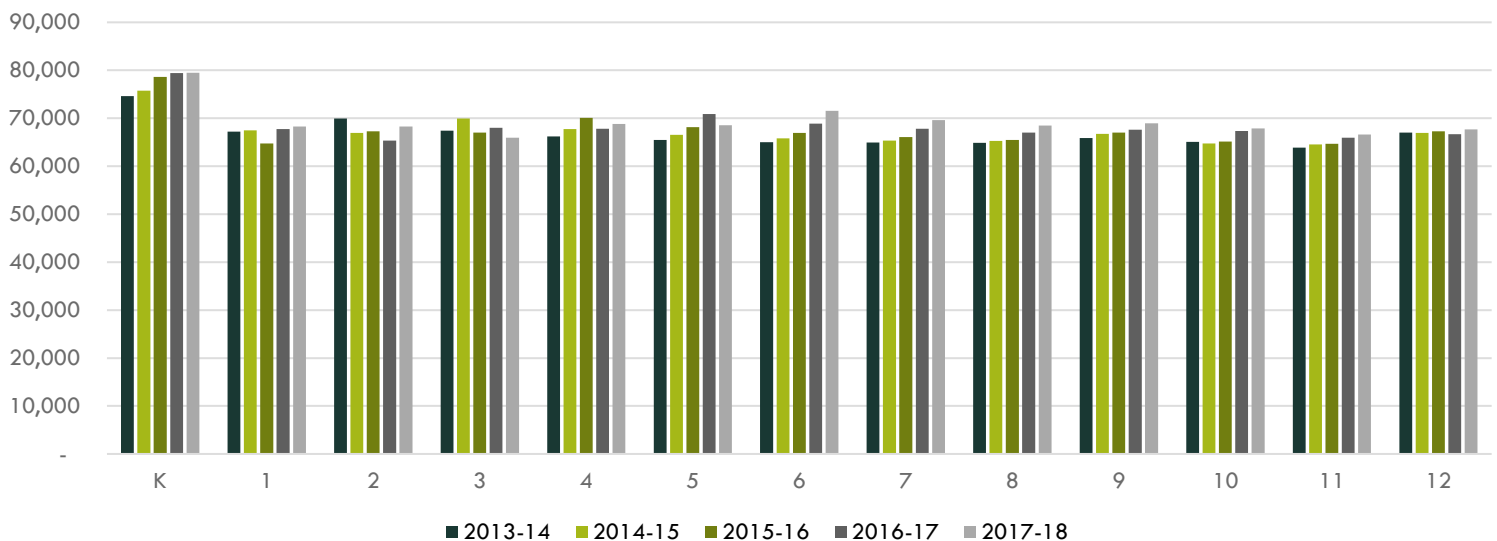


Exhibits 14 and 15 shows how enrollment has fluctuated by grade level over the past five years. Enrollment appears to have increased consistently for grades 6, 7, 8, 9, 10 and 11.

**Exhibit 14: Enrollment by grade level in the region over the last five years**

YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12
2013-14	74,606	67,213	69,911	67,414	66,206	65,488	64,980	64,968	64,890	65,862	65,084	63,878	67,009
2014-13	75,722	67,505	66,974	69,915	67,730	66,535	65,824	65,313	65,277	66,746	64,709	64,560	66,911
2015-16	78,589	64,716	67,248	67,024	70,069	68,173	66,944	66,077	65,501	67,037	65,152	64,688	67,270
2016-17	79,395	67,736	65,333	68,012	67,777	70,845	68,877	67,793	66,979	67,612	67,323	65,914	66,649
2017-18	79,489	68,295	68,292	65,924	68,799	68,547	71,577	69,604	68,449	68,975	67,883	66,627	67,685

**Exhibit 15: Enrollment by grade level in the region over the last five years**

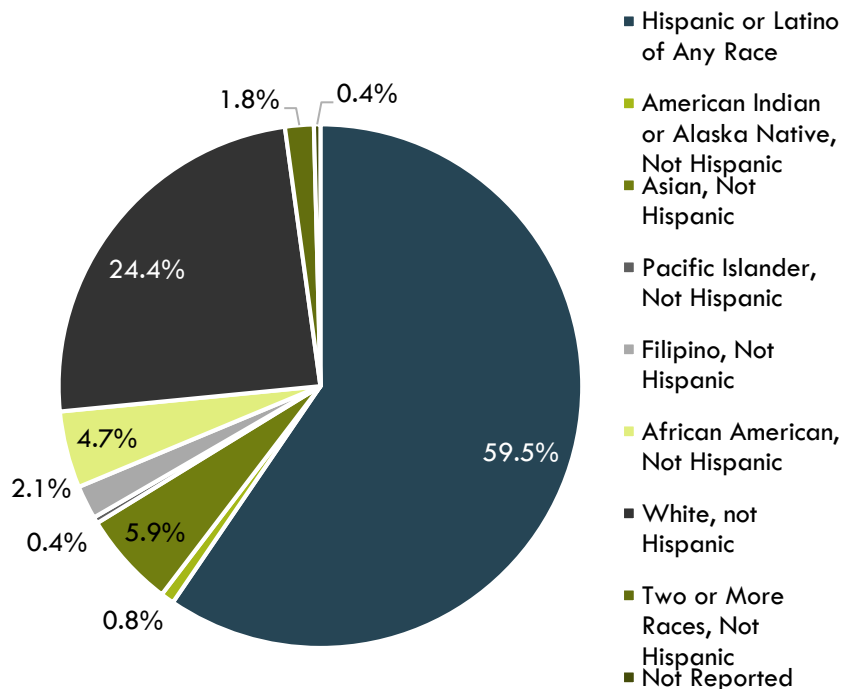


## High School Graduation Analysis

A majority of high school graduates, nearly 60%, identified as Hispanic or Latino of any race, in the 2016-17 academic year (Exhibit 16).

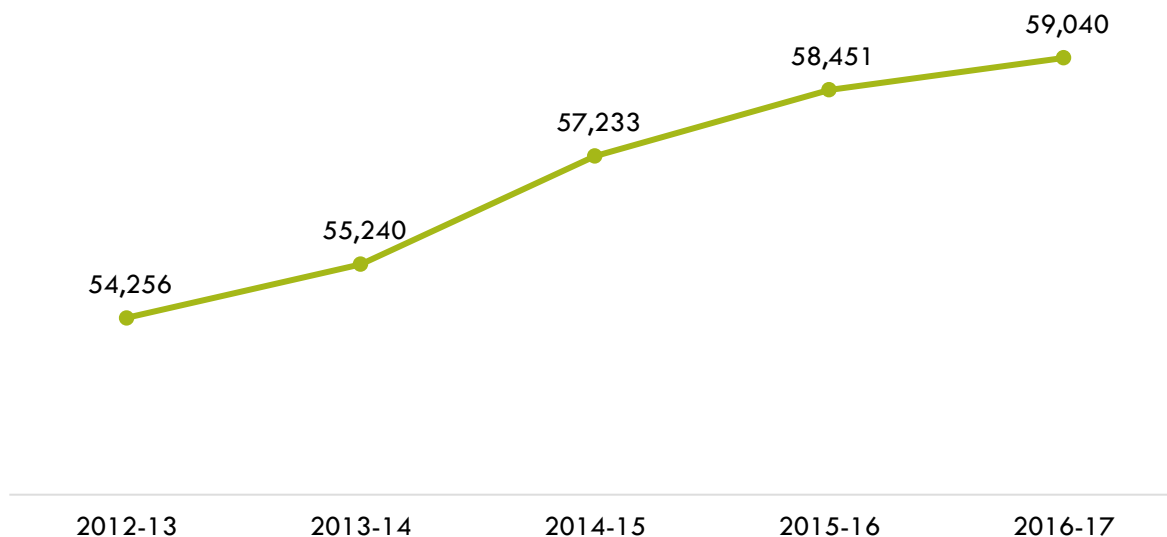
By comparison, 24% of students identified as white, not Hispanic. Nearly 6% of students identified as Asian, not Hispanic, and roughly 5% identified as African American, not Hispanic. Slightly more than 2% of students identified as Filipino, not Hispanic.

Exhibit 17 shows the overall high school graduation trend in the Central Valley/Mother Lode region. Graduation numbers have increased by nearly 5,000 students from 54,256 in the 2012-13 academic year to 59,040 in the 2016-17 academic year.



**Exhibit 16: High school graduates by race/ethnicity, 2016-17 academic year**

**Exhibit 17: High school graduation trend in the region, 2012-13 through 2016-17 academic years**

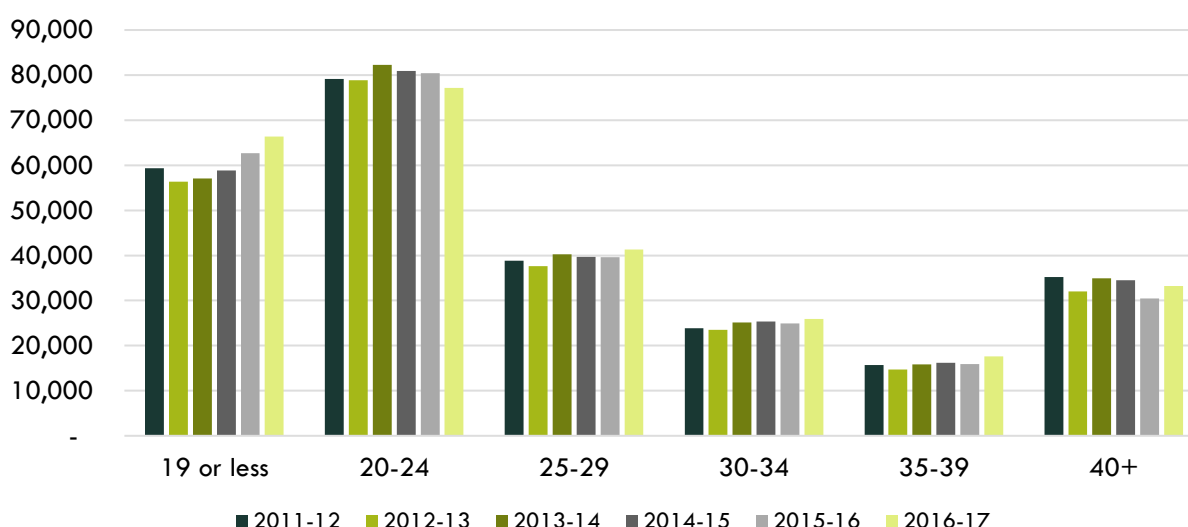


# CTE ENROLLMENT & DEMOGRAPHICS

Central Valley/Mother Lode regional level CTE enrollment has increased over the last five years from 252,533 students in the 2011-12 academic year to 262,021 students in the 2016-17. Enrollment dipped in 2015-16 to 254,244 but recovered the following year.

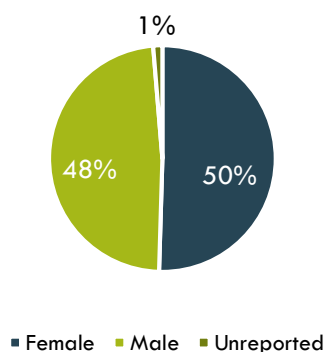
An analysis of student age shows that CTE enrollment has increased for the 19-or-less age range over the last five years, from 59,324 students in 2011-12 to 66,381 in 2016-17 (Exhibit 18). Enrollment also slightly increased for the 25-29 age range, from 38,853 in 2011-12 to 41,297 in 2016-17, and for the 30-34 age range and 35-39 age range, in each case by about 2,000 students. Enrollment declined by nearly 2,000 students from 35,222 in 2011-12 to 33,245 in 2016-17 for the 40+ age range. A similar trend occurred for the 20-24 age range, a decline of 1,965 students during the same time period.

**Exhibit 18: CTE enrollment by age group in the region, 2011-12 through 2016-17 academic years**

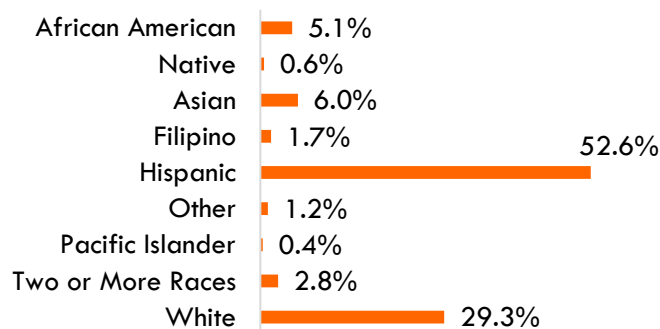


The gender breakdown of CTE enrollment is almost evenly split between male and female students (Exhibit 19). Male students comprise 50% of total enrollment, compared to female students, 48%. Students who identify as Hispanic account for the largest percentage of CTE students, nearly 53% (Exhibit 20). The second largest demographic is students who identify as white, 29%.

**Exhibit 19: CTE gender comparison**



**Exhibit 20: Race/ethnicity of CTE students**





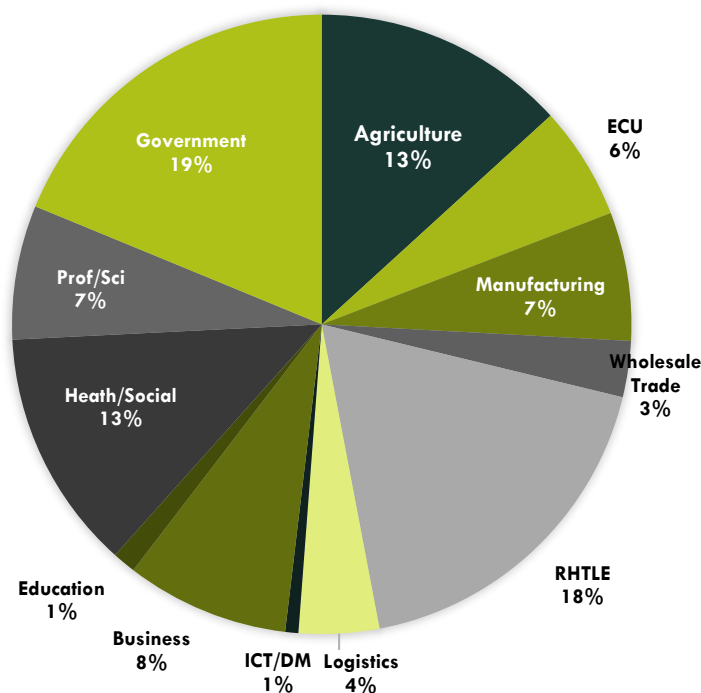
# INDUSTRY-SECTOR OVERVIEW

## Employment Composition

According to 2017 industry data, there were 1.7 million workers in the Central Valley/Mother Lode region. The 12 industries of focus for this report employed roughly 1.3 million. The remaining 440,364 workers are distributed between the professional and science industry and government.

Exhibit 21 shows how employment is distributed among the government and the remaining major industry groupings. The largest share of employment is attributed to government (320,718 jobs). In decreasing order, employment is distributed among:

- Retail, hospitality and tourism (311,192);
- Agriculture (225,966);
- Health care/social services (214,931);
- Business (145,514);
- Professional and science (119,646);
- Manufacturing (114,569);
- Energy, construction and utilities (100,966);
- Logistics (71,643);
- Global trade, which is represented in the chart by wholesale trade (50,040);
- Education (20,802); and
- ICT/digital media (11,674).



**Exhibit 21: Share of government employment compared to employment in the 12 industries studied in this report**

Because government is such a dominant yet diverse industry, an analysis of its staffing patterns by occupation was conducted. Government occupations were reclassified by industry sector type. The government occupational data was then redistributed across the region's sectors to better understand demand-and-supply needs.

Exhibit 22 shows the original 2017 job counts along with occupational projections alongside the new counts after the redistribution of the government data. This resulted in retail, hospitality and tourism becoming

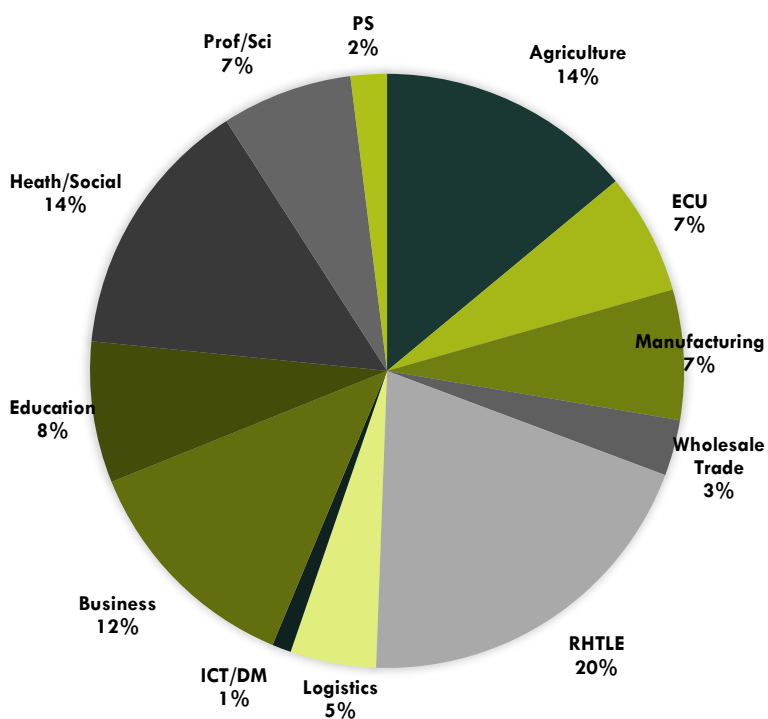
the largest sector by employment (338,179 jobs) with one-fifth of the total number of jobs in 2017. Following second is health care/social services (243,382 jobs) and agriculture (237,724 jobs). Mechanics and welding jobs were summed and equally distributed across the three main sectors that can claim them: agriculture; energy, construction and utilities; and manufacturing.

**Exhibit 22: Redistribution of the government sector into the 12 industries-sectors**

SECTOR	2017 JOBS	5-YEAR CHANGE	2017 JOBS (GOV'T REDISTRIB.)	5-YEAR CHANGE
Government	320,718	24,864	7,154	(33)
RHTE	311,192	21,658	338,179	23,825
Agriculture	225,966	9,562	237,724	10,232
Heath/Social	214,931	36,450	243,382	38,940
Business	145,514	7,381	214,308	10,579
Prof/Sci	119,646	6,072	121,182	6,166
Manufacturing	114,569	3,102	120,330	3,423
ECU	100,966	3,136	112,314	4,095
Logistics	71,643	10,656	79,441	11,180
Wholesale Trade (Global Trade)	50,040	3,076	51,779	3,165
Education	20,802	1,793	130,687	13,224
ICT/DM	11,674	485	17,625	1,071
PS	-	-	33,557	2,367
<b>TOTAL</b>	<b>1,707,661</b>	<b>128,235</b>	<b>1,707,661</b>	<b>128,235</b>

The redistribution of government jobs shows that most new jobs will be created in the health care/social services sector, nearly 35,000 new jobs over five years, followed by the retail, hospitality, tourism and entertainment sector, nearly 24,000 new jobs.

Exhibit 23 provides a visual depiction of the redistributed data. The chart shows how when government jobs are redistributed across the 12 industry sectors, the retail-hospitality-tourism-and-entertainment sector represents the largest share of employment, followed by the agriculture sector and the health care/social services sector. The smallest sectors are ICT/digital media, protective services and wholesale trade.



**Exhibit 23: Share of employment when government occupations are distributed across the 12 industry sectors studied for this report**

## Middle-skill Employment Composition

To get an idea of the job growth that is community college relevant by sector over the next five years, annual openings for middle-skill occupations were analyzed.

Business has the largest number of middle-skill annual job openings in the region, 24,410. This is followed by retail, hospitality, tourism and entertainment (RHTE), 12,709, and health care, 12,459 (Exhibit 24).

Sectors with the smallest number of annual openings include public safety, mechanics and welding, and ICT/digital media.

Although the agriculture, water and environmental technologies industry is one of the largest industries in the region by employment, the number of annual openings for middle-skill occupations is substantially lower than some of the other large industry sectors, such as business, RHTE and health care. However, it is important to note that agriculture is the primary industry in the region; therefore, it will benefit both workers and employers if business students receive some level of content based training that is agriculture related.

**Exhibit 24: Number of new middle-skill jobs by sector in the region**

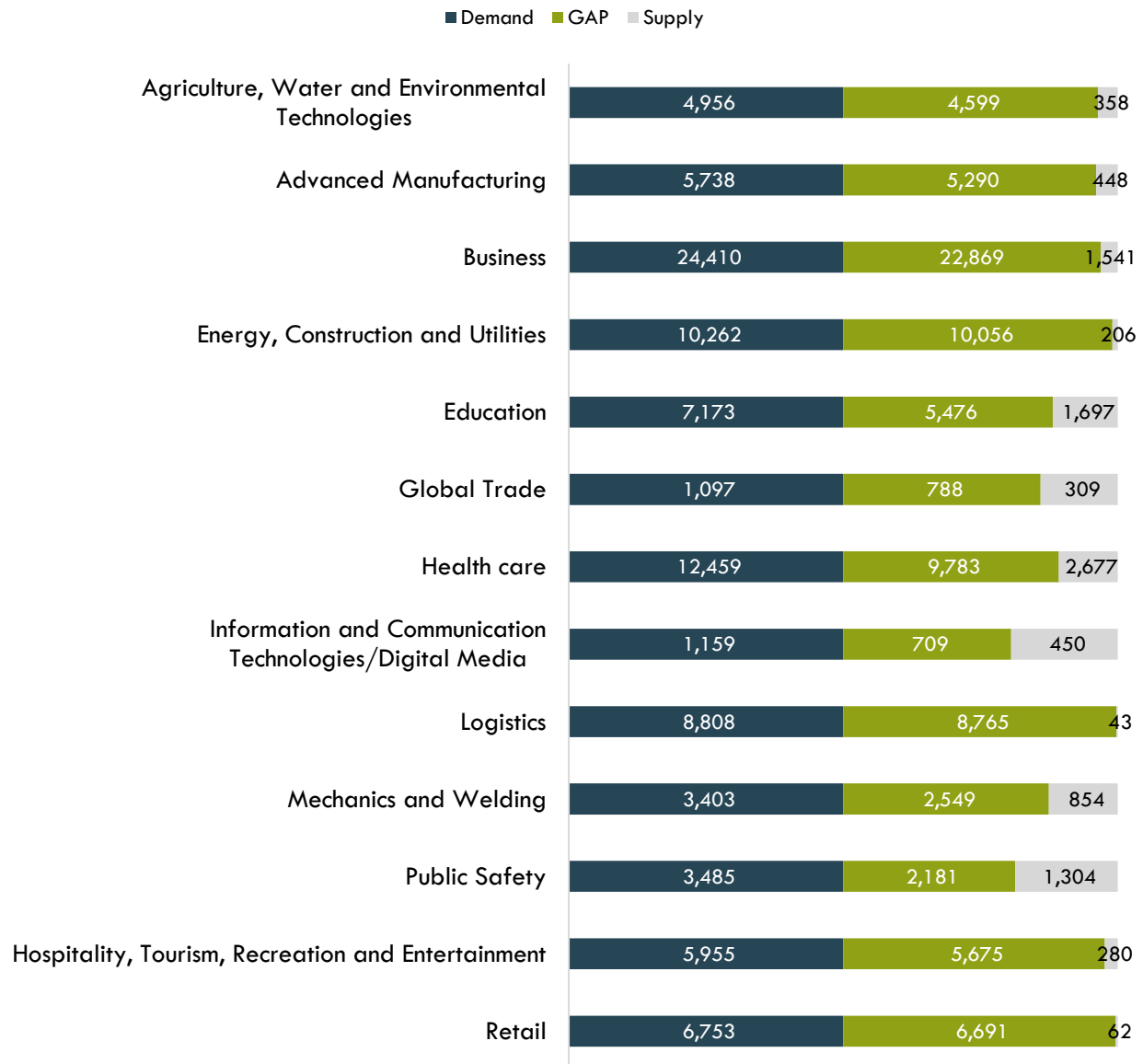
INDUSTRY	ANNUAL OPENINGS
Agriculture, Water and Environmental Technologies	4,956
Advanced Manufacturing	5,738
Business	24,410
Energy, Construction and Utilities	10,262
Education	7,173
Global Trade	1,097
Health care	12,459
Information and Communication Technologies/Digital Media	1,159
Logistics	8,808
Mechanics and Welding	3,403
Public Safety	3,485
Retail, Hospitality, Tourism, Recreation and Entertainment	12,709
<b>TOTAL</b>	<b>95,660</b>



## Gap Analysis

The largest gap or undersupply of middle-skill workers is in the business sector with an annual shortage of 22,869 workers. This again is followed by retail, hospitality, tourism and entertainment for (a combined) total of 12,366; however, the third largest shortage of workers is in energy, construction and utilities, 10,056 (Exhibit 25). Health care is fourth with a projected need of 9,783 workers annually.

**Exhibit 25: Gap analysis by sector in the region**

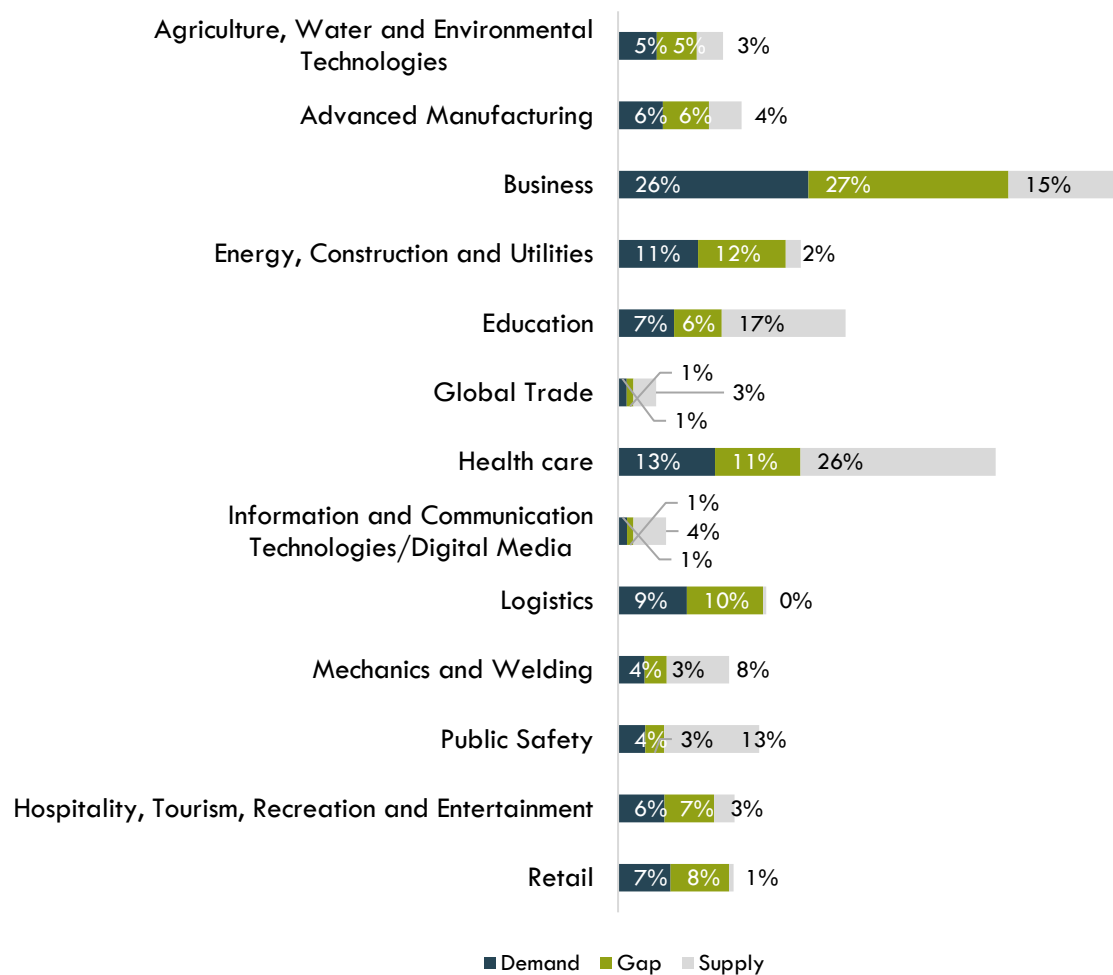


Analysis of the percentage distributions by the overall total reveals the same conclusion, but also provides additional perspective. Health care is contributing 26% of the total supply, followed by education, 17%, and business, 15% (Exhibit 26). Exhibit 27 displays the same data in a chart format to assist with visualization.

**Exhibit 26: Percentage distribution of new jobs by sector in the region**

SECTOR	DEMAND	GAP	SUPPLY
Agriculture, Water and Environmental Technologies	5%	5%	3%
Advanced Manufacturing	6%	6%	4%
Business	26%	27%	15%
Energy, Construction and Utilities	11%	12%	2%
Education	7%	6%	17%
Global Trade	1%	1%	3%
Health care	13%	11%	26%
Information and Communication Technologies/ Digital Media	1%	1%	4%
Logistics	9%	10%	0%
Mechanics and Welding	4%	3%	8%
Public Safety	4%	3%	13%
Hospitality, Tourism, Recreation and Entertainment	6%	7%	3%
Retail	7%	8%	1%

**Exhibit 27: Percentage distribution of new jobs by sector in the region**



# AGRICULTURE, WATER & ENVIRONMENTAL TECHNOLOGIES

## Summary

Occupations with the greatest agriculture employment in the region include farmers, ranchers and other agricultural managers; agricultural equipment operators; and first-line supervisors of farming, fishing and forestry workers. Occupations with strong projected growth include compliance officers; veterinary assistants and laboratory animal caretakers; and veterinary technologists and technicians. Compliance officers earn the highest wages, \$31.27/hour median, followed by water and wastewater treatment plant and system operators, \$27.35/hour median. On average each year, community colleges in the region confer 125 certificates and 233 degrees related to agriculture, water and environmental technologies. The gap analysis reveals a shortage of nearly 4,600 workers in the region.

## Employment & Occupational Demand

**Exhibit 28: Agriculture, water and environmental technologies employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Farmers, Ranchers, and Other Agricultural Managers	16,954	16,514	(440)	(3%)	6,406	1,281
Agricultural Equipment Operators	7,085	7,546	461	7%	6,033	1,207
First-Line Supervisors of Farming, Fishing, and Forestry Workers	5,445	5,788	343	6%	4,043	809
Compliance Officers	1,827	2,029	202	11%	952	190
Pest Control Workers	1,227	1,290	63	5%	912	182
Forest and Conservation Technicians	1,341	1,327	(14)	(1%)	804	161
Veterinary Assistants and Laboratory Animal Caretakers	834	946	112	13%	781	156
Agricultural Inspectors	1,035	1,068	33	3%	733	147
Water and Wastewater Treatment Plant and System Operators	1,661	1,666	5	0%	705	141
Pesticide Handlers, Sprayers, and Applicators, Vegetation	754	816	62	8%	527	105
Veterinary Technologists and Technicians	898	1,023	125	14%	494	99
Animal Trainers	834	825	(9)	(1%)	475	95
Agricultural and Food Science Technicians	878	903	25	3%	472	94
Forest and Conservation Workers	387	389	2	1%	312	62
Life, Physical, and Social Science Technicians, All Other	350	391	41	12%	254	51



OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Logging Equipment Operators	351	370	19	5%	252	50
Food Scientists and Technologists	404	411	7	2%	212	42
Animal Breeders	248	241	(7)	(3%)	192	38

## Wages

### Exhibit 29: Agriculture, water and environmental technologies wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Compliance Officers	\$24.24	\$31.27
Water and Wastewater Treatment Plant and System Operators	\$21.44	\$27.35
Food Scientists and Technologists	\$20.98	\$27.19
Agricultural Inspectors	\$17.25	\$21.30
Life, Physical, and Social Science Technicians, All Other	\$15.65	\$20.08
Agricultural and Food Science Technicians	\$15.42	\$19.36
Animal Breeders	\$14.97	\$16.36
First-Line Supervisors of Farming, Fishing, and Forestry Workers	\$14.22	\$17.37
Logging Equipment Operators	\$14.09	\$18.64
Forest and Conservation Technicians	\$13.35	\$16.09
Pest Control Workers	\$12.90	\$15.99
Pesticide Handlers, Sprayers, and Applicators, Vegetation	\$12.87	\$15.96
Veterinary Technologists and Technicians	\$12.36	\$14.72
Agricultural Equipment Operators	\$11.57	\$13.44
Veterinary Assistants and Laboratory Animal Caretakers	\$11.42	\$13.02
Forest and Conservation Workers	\$11.15	\$11.48
Animal Trainers	\$10.93	\$12.20
Farmers, Ranchers, and Other Agricultural Managers	\$10.70	\$13.19
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

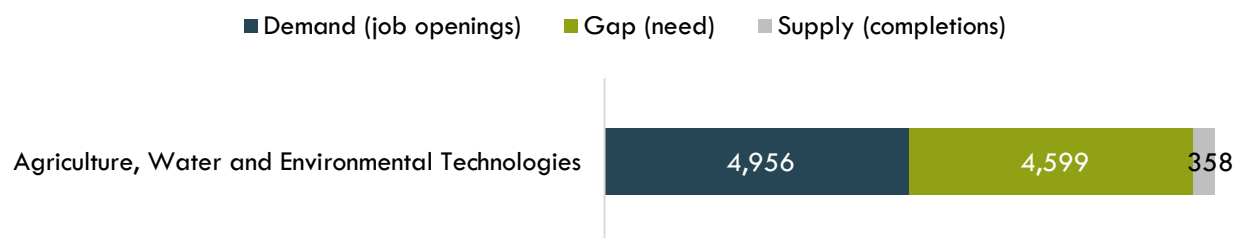
## Community College Supply

**Exhibit 30: Agriculture, water and environmental technologies community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Agricultural Pest Control Adviser and Operator (Licensed)-010310	3		3
Agriculture Business, Sales and Service-011200	15	71	86
Agriculture Technology and Sciences, General-010100	9	25	35
Animal Science-010200	6	44	49
Artificial Inseminator (Licensed)-010220	1		1
Dairy Science-010230	1	4	5
Environmental Science-030100		1	1
Equine Science-010240	5		5
Floriculture / Floristry-010920	1		1
Forestry-011400	15	22	37
Horticulture-010900	5	14	18
Landscape Design and Maintenance-010910	3	2	4
Natural Resources-011500	14	11	25
Nursery Technology-010930	-		-
Other Agriculture and Natural Resources-019900		9	9
Parks and Outdoor Recreation-011510	2	0	3
Plant Science-010300	20	29	49
Veterinary Technician (Licensed)-010210	25	1	26
Water and Wastewater Technology-095800	1		1
<b>TOTAL</b>	<b>125</b>	<b>233</b>	<b>358</b>

## Gap Analysis

**Exhibit 31: Agriculture, water and environmental technologies annual demand and supply in the region**



# ADVANCED MANUFACTURING

## Summary

The largest occupation in the region's advanced manufacturing sector is packaging and filling machine operators and tenders, with 9,865 workers in 2017, followed by first-line supervisors of production and operating workers, nearly 6,000 workers. These two occupations are projected to undergo modest growth and will offer 1,242 and 654 annual openings, respectively. The highest paid occupations are industrial production managers, \$45.05/hour median, and electrical and electronics engineering technicians, \$36.62/hour median. On average each year, community colleges in the region confer 280 certificates, 132 degrees, 32 non-credit awards and four other-credit awards related to advanced manufacturing. The gap analysis reveals a shortage of nearly 5,300 workers in the region.

## Employment & Occupational Demand

**Exhibit 32: Advanced manufacturing employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Packaging and Filling Machine Operators and Tenders	9,865	10,302	437	4%	6,212	1,242
First-Line Supervisors of Production and Operating Workers	5,918	6,261	343	6%	3,272	654
Inspectors, Testers, Sorters, Samplers, and Weighers	4,985	5,064	79	2%	3,084	617
Industrial Machinery Mechanics	5,656	6,078	422	7%	2,915	583
Production, Planning, and Expediting Clerks	2,769	3,011	242	9%	1,687	337
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	1,814	1,897	83	5%	1,072	214
Mixing and Blending Machine Setters, Operators, and Tenders	1,607	1,668	61	4%	980	196
Maintenance Workers, Machinery	1,441	1,533	92	6%	836	167
Industrial Production Managers	1,572	1,644	72	5%	628	126
Electrical and Electronics Engineering Technicians	1,288	1,298	10	1%	588	118
Sawing Machine Setters, Operators, and Tenders, Wood	715	774	59	8%	485	97
Engineering Technicians, Except Drafters, All Other	990	1,005	15	2%	446	89
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	596	651	55	9%	393	79
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	514	542	28	5%	344	69
Computer-Controlled Machine Tool Operators, Metal and Plastic	542	578	36	7%	312	62

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	515	508	(7)	(1%)	290	58
Conveyor Operators and Tenders	326	367	41	13%	271	54
Molders, Shapers, and Casters, Except Metal and Plastic	488	489	1	0%	260	52
Chemical Equipment Operators and Tenders	396	415	19	5%	237	47
Petroleum Pump System Operators, Refinery Operators, and Gaugers	405	404	(1)	(0%)	215	43

## Wages

### Exhibit 33: Advanced manufacturing wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Industrial Production Managers	\$33.09	\$45.05
Electrical and Electronics Engineering Technicians	\$30.08	\$36.62
Petroleum Pump System Operators, Refinery Operators, and Gaugers	\$28.46	\$35.42
Engineering Technicians, Except Drafters, All Other	\$26.89	\$35.31
Industrial Machinery Mechanics	\$19.93	\$25.29
First-Line Supervisors of Production and Operating Workers	\$19.01	\$26.41
Production, Planning, and Expediting Clerks	\$17.18	\$22.55
Maintenance Workers, Machinery	\$15.88	\$20.58
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	\$15.84	\$20.67
Computer-Controlled Machine Tool Operators, Metal and Plastic	\$15.50	\$18.99
Chemical Equipment Operators and Tenders	\$13.92	\$17.69
Molders, Shapers, and Casters, Except Metal and Plastic	\$13.61	\$17.76
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	\$13.27	\$16.12
Mixing and Blending Machine Setters, Operators, and Tenders	\$13.05	\$17.04
Conveyor Operators and Tenders	\$12.82	\$14.88
Inspectors, Testers, Sorters, Samplers, and Weighers	\$12.49	\$16.03
Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	\$12.15	\$14.40
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	\$11.96	\$14.36

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Packaging and Filling Machine Operators and Tenders	\$11.45	\$13.41
Sawing Machine Setters, Operators, and Tenders, Wood	\$11.42	\$12.59
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

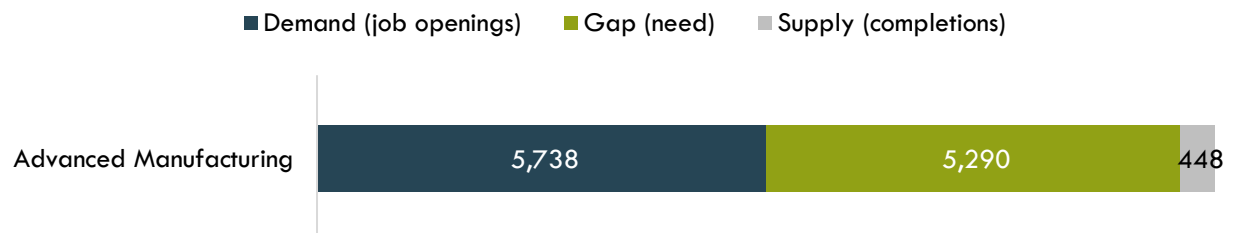
## Community College Supply

**Exhibit 34: Advanced manufacturing community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	NON-CREDIT	OTHER CREDIT	SUBTOTAL
Industrial Arts (Transfer)-083900		0			0
Computer Electronics-093410	11	8			19
Drafting Technology-095300	41	20			61
Electron Microscopy-093470	15	5			20
Electronics and Electric Technology-093400	83	25		4	112
Engineering Technology, General (requires Trigonometry)-092400		2			2
Engineering, General (requires Calculus) (Transfer)-090100		35			35
Industrial Electronics-093420	21	10			31
Industrial Systems Technology and Maintenance-094500	37	4	9		50
Instrumentation Technology-094300	1	1			3
Manufacturing and Industrial Technology-095600	30	3	23		57
Mechanical Drafting-095340	16	9			25
Other Engineering and Related Industrial Technologies-099900	23	7			30
Printing and Lithography-093600	0	2			3
<b>TOTAL</b>	<b>280</b>	<b>132</b>	<b>32</b>	<b>4</b>	<b>448</b>

## Gap Analysis

**Exhibit 35: Advanced manufacturing annual demand and supply in the region**



# BUSINESS

## Summary

The largest business occupations include office clerks (general) with nearly 30,000 workers in 2017, and secretaries and administration assistants (except legal, medical and executive) with more than 22,500 workers in the region. These occupations will offer a substantial number of annual openings in coming years in the region. Most business-related occupations are projected to undergo modest to moderate growth; however, tellers are projected to decline by 9%, a loss of 367 jobs over five years, as are executive secretaries and executive administrative assistants, a 3% drop representing a loss of 106 jobs. General and operations managers earn the highest wages in the region, \$42.81/hour median. On average each year, community colleges in the region confer 383 certificates, 1,139 degrees and 19 non-credit awards related to business. The gap analysis reveals a shortage of 22,869 workers in the region.

## Employment & Occupational Demand

**Exhibit 36: Business employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Office Clerks, General	29,824	31,041	1,217	4%	18,920	3,784
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	22,560	22,918	358	2%	12,550	2,510
Bookkeeping, Accounting, and Auditing Clerks	17,143	17,418	275	2%	9,819	1,964
General and Operations Managers	17,818	19,335	1,517	9%	8,937	1,787
First-Line Supervisors of Office and Administrative Support Workers	13,775	14,604	829	6%	7,710	1,542
Receptionists and Information Clerks	8,956	9,756	800	9%	6,830	1,366
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	10,708	11,433	725	7%	6,281	1,256
Sales Representatives, Services, All Other	6,826	7,485	659	10%	4,873	975
Business Operations Specialists, All Other	8,761	9,420	659	8%	4,696	939
Insurance Sales Agents	6,293	6,821	528	8%	3,689	738
Billing and Posting Clerks	5,277	5,753	476	9%	3,171	634
Office and Administrative Support Workers, All Other	3,783	3,994	211	6%	2,298	460
Tellers	3,943	3,576	(367)	(9%)	2,170	434
Executive Secretaries and Executive Administrative Assistants	3,971	3,865	(106)	(3%)	2,126	425



OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Insurance Claims and Policy Processing Clerks	3,490	3,628	138	4%	1,917	383
Eligibility Interviewers, Government Programs	3,555	3,840	285	8%	1,891	378
Information and Record Clerks, All Other	2,905	3,038	133	5%	1,784	357
Real Estate Sales Agents	3,499	3,491	(8)	(0%)	1,643	329
First-Line Supervisors of Non-Retail Sales Workers	2,913	3,050	137	5%	1,469	294
Payroll and Timekeeping Clerks	2,698	2,719	21	1%	1,365	273

## Wages

### Exhibit 37: Business wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
General and Operations Managers	\$29.79	\$42.81
Business Operations Specialists, All Other	\$22.23	\$32.01
Executive Secretaries and Executive Administrative Assistants	\$21.90	\$26.74
First-Line Supervisors of Office and Administrative Support Workers	\$19.94	\$25.27
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$19.29	\$26.21
Real Estate Sales Agents	\$18.00	\$19.33
Eligibility Interviewers, Government Programs	\$16.58	\$21.70
Payroll and Timekeeping Clerks	\$16.46	\$20.36
First-Line Supervisors of Non-Retail Sales Workers	\$16.37	\$19.57
Sales Representatives, Services, All Other	\$16.01	\$21.25
Bookkeeping, Accounting, and Auditing Clerks	\$15.72	\$19.06
Information and Record Clerks, All Other	\$15.36	\$18.75
Insurance Sales Agents	\$15.03	\$21.17
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	\$14.09	\$17.53
Insurance Claims and Policy Processing Clerks	\$13.79	\$16.95
Billing and Posting Clerks	\$13.50	\$16.43
Office Clerks, General	\$11.83	\$15.42
Receptionists and Information Clerks	\$11.55	\$13.47
Tellers	\$11.50	\$13.04
Office and Administrative Support Workers, All Other	\$11.14	\$13.84
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

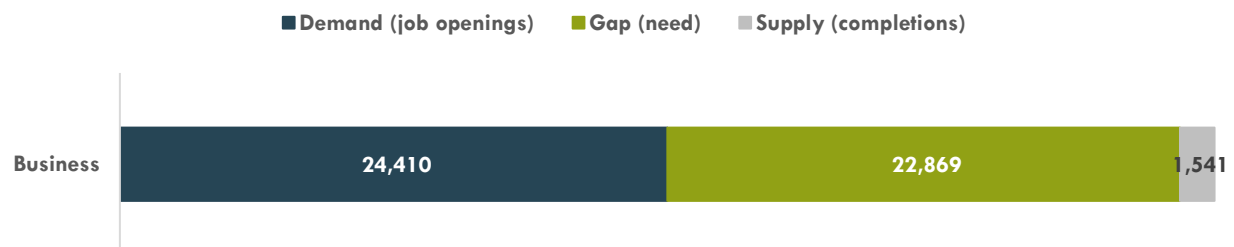
## Community College Supply

**Exhibit 38: Business community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	NON-CREDIT	SUBTOTAL
Accounting-050200	74	160		234
Banking and Finance-050400	4	8		12
Business Administration-050500	12	826		838
Business Management-050600	41	38		79
Court Reporting-051430	0	1		1
Legal Office Technology-051410	8			8
Management Development and Supervision-050630	29	7		36
Office Management-051440	12	4		15
Office Technology/Office Computer Applications-051400	127	58	19	204
Other Business and Management-059900	2			2
Paralegal-140200	36	31		68
Real Estate-051100	25	5		30
Sales and Salesmanship-050940	0			0
Small Business and Entrepreneurship-050640	8	3		11
Tax Studies-050210	4			4
<b>TOTAL</b>	<b>383</b>	<b>1,139</b>	<b>19</b>	<b>1,541</b>

## Gap Analysis

**Exhibit 39: Business annual demand and supply in the region**



# ENERGY, CONSTRUCTION & UTILITIES

## Summary

The largest occupation is maintenance and repair workers (general) with more than 15,000 workers in the region in 2017. This occupation is projected to undergo moderate growth, 8%, and offer 1,746 annual openings. The second largest occupation is carpenters, with 9,655 workers in 2017; while this occupation is not projected to grow, it will still offer the second highest number of openings in the industry, 935 each year. Occupations earning the highest wages include electricians, \$29.26/hour median, and operating engineers and other construction equipment operators, \$24.37/hour median. On average each year, community colleges in the region confer 169 certificates and 37 degrees related to energy, construction and utilities. The gap analysis reveals a shortage of 10,056 workers in the region.

## Employment & Occupational Demand

**Exhibit 40: Energy, construction and utilities employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Maintenance and Repair Workers, General	15,105	16,301	1,196	8%	8,728	1,746
Carpenters	9,655	9,693	38	0%	4,676	935
Electricians	5,747	5,927	180	3%	3,418	684
First-Line Supervisors of Construction Trades and Extraction Workers	5,837	5,970	133	2%	3,148	630
Plumbers, Pipefitters, and Steamfitters	3,892	4,485	593	15%	2,757	551
Operating Engineers and Other Construction Equipment Operators	3,539	3,759	220	6%	2,234	447
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	3,211	3,652	441	14%	2,080	416
Painters, Construction and Maintenance	4,387	4,357	(30)	(1%)	1,970	394
Telecommunications Equipment Installers and Repairers, Except Line Installers	2,709	2,837	128	5%	1,572	314
Cement Masons and Concrete Finishers	2,516	2,583	67	3%	1,460	292
Construction Managers	3,658	3,619	(39)	(1%)	1,381	276
Installation, Maintenance, and Repair Workers, All Other	2,401	2,523	122	5%	1,279	256
Roofers	1,884	1,969	85	5%	1,076	215
Drywall and Ceiling Tile Installers	2,443	2,224	(219)	(9%)	1,067	213
Sheet Metal Workers	1,245	1,373	128	10%	802	160

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Service Unit Operators, Oil, Gas, and Mining	1,154	1,030	(124)	(11%)	655	131
Solar Photovoltaic Installers	516	769	253	49%	578	116
Cabinetmakers and Bench Carpenters	955	998	43	5%	556	111
Telecommunications Line Installers and Repairers	938	992	54	6%	551	110
Plasterers and Stucco Masons	1,090	1,078	(12)	(1%)	542	108

## Wages

**Exhibit 41: Energy, construction and utilities wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Electricians	\$20.81	\$29.26
Operating Engineers and Other Construction Equipment Operators	\$20.57	\$24.37
Service Unit Operators, Oil, Gas, and Mining	\$20.50	\$25.70
Telecommunications Line Installers and Repairers	\$20.45	\$30.03
First-Line Supervisors of Construction Trades and Extraction Workers	\$19.62	\$28.47
Telecommunications Equipment Installers and Repairers, Except Line Installers	\$17.55	\$23.55
Plasterers and Stucco Masons	\$17.21	\$22.20
Sheet Metal Workers	\$16.88	\$22.09
Drywall and Ceiling Tile Installers	\$16.64	\$24.97
Cement Masons and Concrete Finishers	\$16.31	\$20.09
Plumbers, Pipefitters, and Steamfitters	\$16.21	\$20.83
Construction Managers	\$16.09	\$29.91
Roofers	\$15.97	\$21.01
Solar Photovoltaic Installers	\$15.92	\$18.95
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$15.42	\$20.79
Maintenance and Repair Workers, General	\$13.89	\$18.78
Carpenters	\$13.88	\$16.66
Installation, Maintenance, and Repair Workers, All Other	\$13.56	\$16.31
Painters, Construction and Maintenance	\$12.67	\$14.30
Cabinetmakers and Bench Carpenters	\$12.66	\$15.91
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

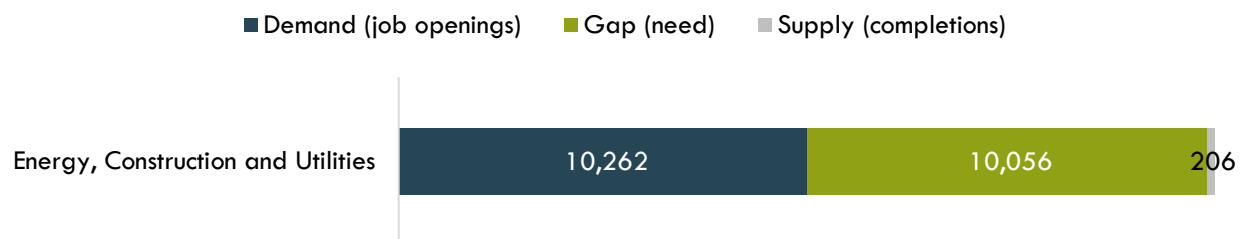
## Community College Supply

**Exhibit 42: Energy, construction and utilities community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Architectural Drafting-095310	3	0	3
Architecture and Architectural Technology-020100	16	18	34
Carpentry-095210	1	0	1
Civil and Construction Management Technology-095700	1		1
Civil Drafting-095320		0	0
Construction Crafts Technology-095200	4	3	7
Construction Inspection-095720	0	1	1
Electrical-095220	55	4	59
Electro-Mechanical Technology-093500	1		1
Environmental Control Technology-094600	63	9	72
Mill and Cabinet Work-095250	3	0	3
Plumbing, Pipefitting and Steamfitting-095230	5		5
Telecommunications Technology-093430	19		19
<b>TOTAL</b>	<b>169</b>	<b>37</b>	<b>206</b>

## Gap Analysis

**Exhibit 43: Energy, construction and utilities annual demand and supply in the region**



# EDUCATION

## Summary

Teacher assistants comprise the largest education occupation in the region, with more than 21,700 workers in 2017, followed by childcare workers, with more than 14,300 workers. There are projected to be 2,701 annual openings for teacher assistants, resulting from a 9% growth rate. Childcare workers is expected to decline by 7% over the next five years, although it will still offer 2,020 annual openings. The highest paid occupation is career/technical education teachers (secondary school), \$36.03/hour median. Kindergarten teachers (except special education) earn \$33.01/hour median. On average each year, community colleges in the region confer 1,184 certificates and 513 degrees related to education. The gap analysis reveals a shortage of 5,476 workers in the region.

## Employment & Occupational Demand

**Exhibit 44: Education employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Teacher Assistants	21,727	23,765	2,038	9%	13,507	2,701
Childcare Workers	14,314	13,350	(964)	(7%)	10,099	2,020
Preschool Teachers, Except Special Education	4,857	5,022	165	3%	2,644	529
Self-Enrichment Education Teachers	2,664	2,901	237	9%	1,745	349
Kindergarten Teachers, Except Special Education	2,177	2,394	217	10%	1,312	262
Training and Development Specialists	1,761	1,963	202	11%	1,088	218
Library Technicians	1,230	1,326	96	8%	925	185
Library Assistants, Clerical	687	760	73	11%	577	115
Career/Technical Education Teachers, Secondary School	623	721	98	16%	326	65
Education Administrators, Preschool and Childcare Center/Program	683	688	5	1%	284	57
Special Education Teachers, Preschool	204	246	42	21%	120	24
Social Science Research Assistants	146	162	16	11%	105	21



## Wages

### Exhibit 45: Education wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Career/Technical Education Teachers, Secondary School	\$28.63	\$36.03
Kindergarten Teachers, Except Special Education	\$26.73	\$33.01
Special Education Teachers, Preschool	\$21.47	\$27.70
Training and Development Specialists	\$17.47	\$25.39
Library Technicians	\$16.03	\$17.88
Self-Enrichment Education Teachers	\$13.99	\$19.17
Education Administrators, Preschool and Childcare Center/Program	\$13.81	\$19.36
Social Science Research Assistants	\$12.63	\$15.05
Teacher Assistants	\$12.50	\$14.92
Preschool Teachers, Except Special Education	\$11.71	\$14.64
Library Assistants, Clerical	\$11.58	\$14.75
Childcare Workers	\$7.45	\$9.77
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		



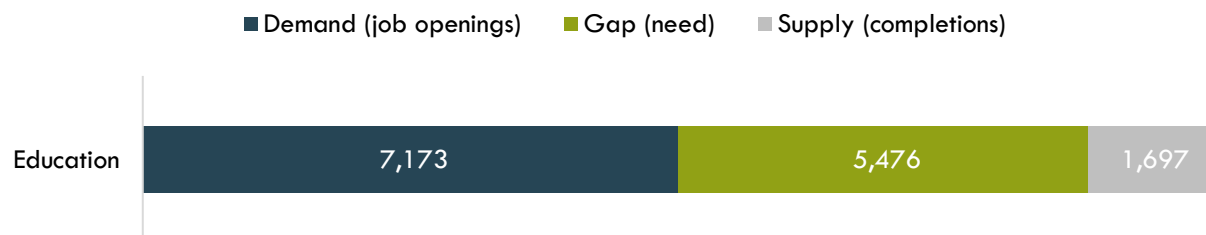
## Community College Supply

**Exhibit 46: Education community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Education, General-080100		0	0
Educational Aide (Teacher Assistant)-080200	26	7	33
Library Technician (Aide)-160200	8	3	11
Physical Education-083500		75	75
Special Education-080900	1	2	3
Child Development Administration and Management-130580	10		10
Child Development/Early Care and Education-130500	1,108	373	1,481
Children with Special Needs-130520	15	1	15
Family and Consumer Sciences, General-130100		17	17
Foster and Kinship Care-130570	1		1
Infants and Toddlers-130590			
Other Family and Consumer Sciences-139900	1		1
Parenting and Family Education-130560	0		0
Preschool Age Children-130540		34	34
The School Age Child-130550	14		14
<b>TOTAL</b>	<b>1,184</b>	<b>513</b>	<b>1,697</b>

## Gap Analysis

**Exhibit 47: Education annual demand and supply in the region**



# GLOBAL TRADE

## Summary

Three occupations make up the bulk of employment in the region's global trade industry—buyers and purchasing agents, 3,475 workers in 2017, cost estimators, 2,490 and administrative services managers, 2,619. The buyers and purchasing agents occupation is projected to experience only a 1% growth rate and offer 340 annual openings. Cost estimators is expected to increase by 6% with 273 annual openings. Only one occupation is expected to decline, brokerage clerks at 3%, which represents a loss of eight jobs through 2022. Administrative services managers earn the highest median wages, \$42.85/hour, followed by cost estimators \$34.52/hour. On average each year, community colleges in the region confer 52 certificates and 242 degrees related to global trade. The gap analysis reveals a shortage of 788 workers in the region.

## Employment & Occupational Demand

**Exhibit 48: Global trade employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Buyers and Purchasing Agents	3,475	3,510	35	1%	1,702	340
Cost Estimators	2,490	2,627	137	6%	1,364	273
Administrative Services Managers	2,619	2,830	211	8%	1,286	257
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1,768	1,857	89	5%	1,013	203
Brokerage Clerks	235	227	(8)	(3%)	120	24

## Wages

**Exhibit 49: Global trade wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Administrative Services Managers	\$32.35	\$42.85
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	\$26.75	\$34.52
Cost Estimators	\$22.10	\$30.08
Buyers and Purchasing Agents	\$20.43	\$25.79
Brokerage Clerks	\$20.37	\$24.50
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

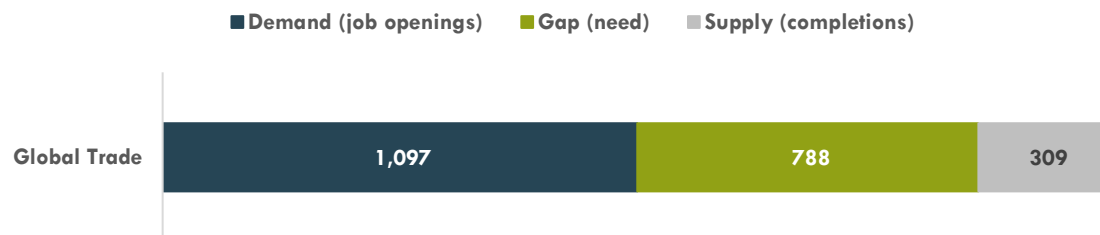
## Community College Supply

**Exhibit 50: Global trade community college supply**

TOP Title-Code	Certificate	Degree	Subtotal
International Studies-221000		15	15
Business and Commerce, General-050100	45	228	273
International Business and Trade-050800	2		2
Marketing and Distribution-050900	4	14	19
<b>TOTAL</b>	<b>52</b>	<b>242</b>	<b>309</b>

## Gap Analysis

**Exhibit 51: Global trade annual demand and supply in the region**



# HEALTH CARE

## Summary

The top three largest health care occupations are registered nurses, nearly 28,000 workers in 2017, nursing assistants, 10,444 workers, and medical assistants, more than 9,800 workers. These occupations are projected to undergo 13% to 16% growth and offer substantial annual openings. One notable occupation is home health aides which is expected to grow by 81%, with 591 annual openings; however, this occupation pays the lowest median wage in the industry in the region, \$11.97/hour. Dental hygienists earn the highest median wage, \$44.81/hour. On average each year, community colleges in the region confer 1,088 certificates, 1,521 degrees and 67 other-credit awards related to health care. The gap analysis reveals a shortage of 9,783 workers in the region.

## Employment & Occupational Demand

**Exhibit 52: Health care employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017-2022 OPENINGS	ANNUAL OPENINGS
Registered Nurses	27,987	31,518	3,531	13%	10,960	2,192
Nursing Assistants	10,444	11,874	1,430	14%	7,608	1,522
Medical Assistants	9,873	11,406	1,533	16%	7,084	1,417
Medical Secretaries	6,650	7,553	903	14%	4,659	932
Social and Human Service Assistants	5,201	6,060	859	17%	4,129	826
Dental Assistants	4,876	5,392	516	11%	3,274	655
Licensed Practical and Licensed Vocational Nurses	6,789	7,495	706	10%	3,208	642
Home Health Aides	1,865	3,382	1,517	81%	2,957	591
Pharmacy Technicians	4,140	4,479	339	8%	1,993	399
Emergency Medical Technicians and Paramedics	2,293	2,549	256	11%	1,047	209
Psychiatric Technicians	2,013	2,037	24	1%	941	188
Medical Records and Health Information Technicians	2,021	2,234	213	11%	840	168
Phlebotomists	1,182	1,364	182	15%	822	164
Dental Hygienists	1,820	2,067	247	14%	817	163
Radiologic Technologists	1,931	2,159	228	12%	750	150
Pharmacy Aides	1,094	1,074	(20)	(2%)	733	147
Surgical Technologists	1,020	1,165	145	14%	565	113
Physical Therapist Aides	698	813	115	16%	559	112
Respiratory Therapists	1,413	1,616	203	14%	551	110
Physical Therapist Assistants	501	632	131	26%	464	93

## Wages

**Exhibit 53: Health care wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Dental Hygienists	\$38.94	\$44.81
Registered Nurses	\$36.88	\$45.53
Respiratory Therapists	\$31.68	\$37.42
Radiologic Technologists	\$28.07	\$35.66
Psychiatric Technicians	\$24.25	\$27.80
Physical Therapist Assistants	\$23.93	\$27.99
Surgical Technologists	\$22.67	\$27.38
Licensed Practical and Licensed Vocational Nurses	\$21.62	\$25.23
Phlebotomists	\$15.49	\$18.26
Medical Records and Health Information Technicians	\$15.23	\$19.83
Pharmacy Technicians	\$14.58	\$17.74
Social and Human Service Assistants	\$14.35	\$17.39
Medical Secretaries	\$13.90	\$16.88
Dental Assistants	\$13.84	\$16.86
Medical Assistants	\$12.76	\$14.75
Emergency Medical Technicians and Paramedics	\$12.66	\$15.08
Nursing Assistants	\$12.14	\$14.08
Pharmacy Aides	\$11.48	\$13.12
Physical Therapist Aides	\$11.19	\$12.67
Home Health Aides	\$10.79	\$11.97
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		



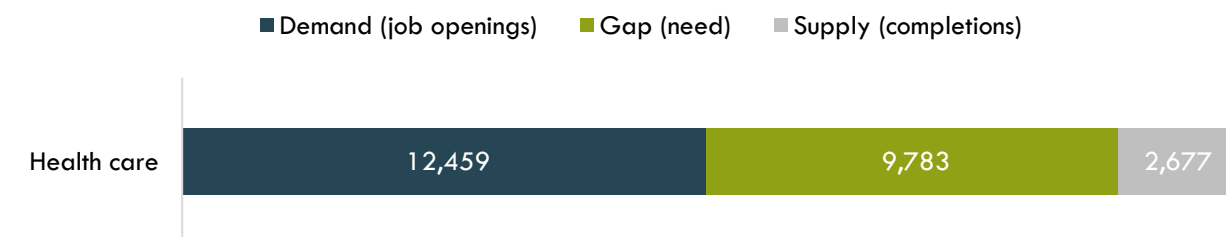
## Community College Supply

**Exhibit 54: Health care community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	OTHER CREDIT	SUBTOTAL
Administrative Medical Assisting-120820	9			9
Alcohol and Controlled Substances-210440	61	19		80
Athletic Training and Sports Medicine-122800		24		24
Certified Nurse Assistant-123030	260		23	283
Clinical Medical Assisting-120810	24	14		38
Health Education-083700		1		1
Industrial and Occupational Safety and Health-095670	7	10		16
Laboratory Science Technology-095500	-	0		0
Dental Assistant-124010	24	7		32
Dental Hygienist-124020	18	42		60
Diagnostic Medical Sonography-122700	3			3
Emergency Medical Services-125000	204	1	44	249
Gerontology-130900	1			1
Health Information Coding-122310	3			3
Health Information Technology-122300		6		6
Health Occupations, General-120100		85		85
Health Professions, Transfer Core Curriculum-126000	10	115		125
Human Services-210400	103	118		221
Licensed Vocational Nursing-123020	71	23		94
Medical Assisting-120800	33	22		55
Medical Office Technology-051420	57	35		92
Paramedic-125100	6	1		7
Pharmacy Technology-122100	13			13
Phlebotomy-120510	14			14
Physical Therapist Assistant-122200		23		23
Psychiatric Technician-123900	136	73		209
Radiologic Technology-122500	27	68		96
Registered Nursing-123010	3	778		781
Respiratory Care/Therapy-121000		37		37
Speech/Language Pathology and Audiology-122000		17		17
<b>TOTAL</b>	<b>1,088</b>	<b>1,521</b>	<b>67</b>	<b>2,677</b>

## Gap Analysis

**Exhibit 55: Health care annual demand and supply in the region**





# ICT & DIGITAL MEDIA

## Summary

ICT/digital media is the smallest sector analyzed in this report. The largest occupation is computer user support specialists. This occupation employed 3,275 workers in 2017 and is projected to increase by 10% over the next five years, offering 315 annual openings. Graphic designers, the second largest ICT/digital media occupation in the region, is projected to experience subdued growth, only 3%, but will still offer 163 annual openings. Computer network architects earn the highest median wage, \$44.28/hour. The lowest median wage is earned by computer, automated teller, and office machine repairers, \$17.98/hour. On average each year, community colleges in the region confer 222 certificates and 228 degrees related to ICT and digital media. The gap analysis reveals a shortage of 709 workers in the region.

## Employment & Occupational Demand

**Exhibit 56: ICT/digital media employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Computer User Support Specialists	3,275	3,605	330	10%	1,573	315
Graphic Designers	1,626	1,671	45	3%	813	163
Computer Occupations, All Other	1,971	2,074	103	5%	774	155
Network and Computer Systems Administrators	1,772	1,912	140	8%	705	141
Computer Network Support Specialists	880	977	97	11%	432	86
Computer, Automated Teller, and Office Machine Repairers	752	759	7	1%	411	82
Web Developers	685	738	53	8%	298	60
Surveying and Mapping Technicians	446	471	25	6%	267	53
Medical Equipment Repairers	278	315	37	13%	165	33
Computer Network Architects	357	399	42	12%	162	32
Media and Communication Equipment Workers, All Other	246	248	2	1%	116	23

## Wages

**Exhibit 57: ICT/digital media wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Computer Network Architects	\$34.01	\$44.28
Network and Computer Systems Administrators	\$28.66	\$37.40
Media and Communication Equipment Workers, All Other	\$28.28	\$34.04
Computer Occupations, All Other	\$27.14	\$37.87
Computer Network Support Specialists	\$23.37	\$31.09
Surveying and Mapping Technicians	\$22.21	\$27.00
Computer User Support Specialists	\$19.29	\$23.57
Web Developers	\$18.60	\$22.38
Medical Equipment Repairers	\$17.14	\$21.58
Graphic Designers	\$16.31	\$19.04
Computer, Automated Teller, and Office Machine Repairers	\$15.24	\$17.98
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

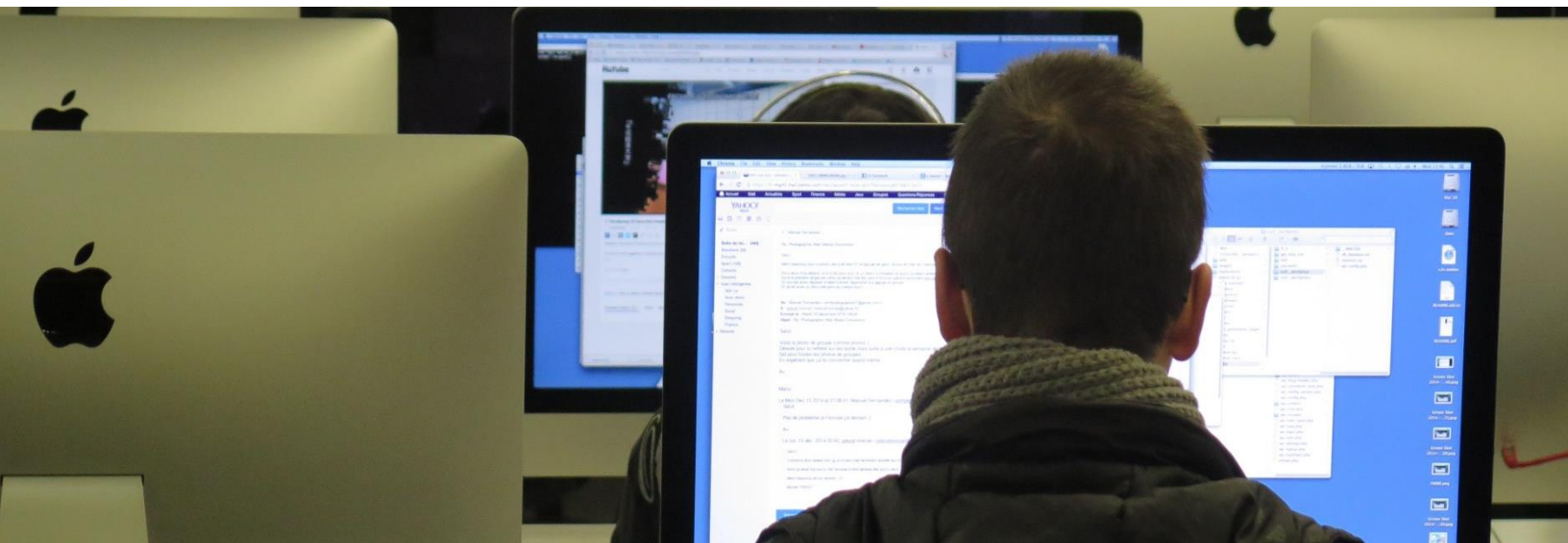
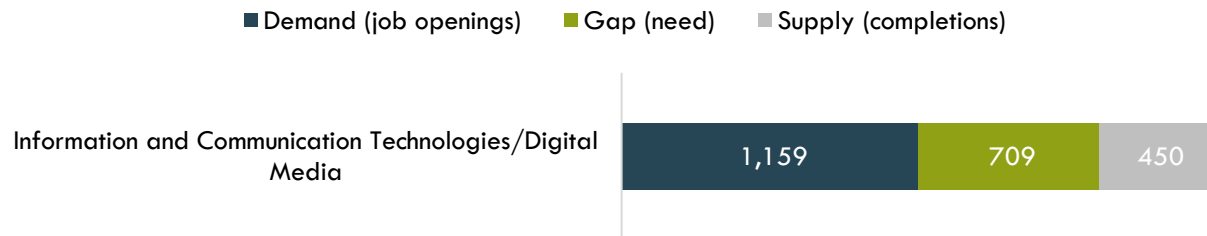
## Community College Supply

**Exhibit 58: ICT/digital media community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Computer Graphics and Digital Imagery-061460	4	16	20
Digital Media-061400	5	1	6
Journalism-060200		19	19
Media and Communications, General-060100		8	8
Radio and Television-060400		7	7
Radio-060410	2	2	3
Television (including combined TV/Film/Video)-060420	2		2
Website Design and Development-061430	4	4	8
Computer Information Systems-070200	39	56	95
Computer Infrastructure and Support-070800	11		11
Computer Networking-070810	38	20	58
Computer Programming-070710	8	0	8
Computer Science (Transfer)-070600		49	49
Computer Support-070820	1	-	1
Information Technology, General-070100	7		7
Software Applications-070210	64	17	81
World Wide Web Administration-070900	1	1	2
Geographic Information Systems-220610	8	2	11
Graphic Art and Design-103000	28	26	53
<b>TOTAL</b>	<b>222</b>	<b>228</b>	<b>450</b>

## Gap Analysis

### Exhibit 59: ICT/digital media annual demand and supply in the region



# LOGISTICS

## Summary

Heavy and tractor-trailer truck drivers comprise the largest logistics occupation and are projected to offer the most annual openings, 3,793. The second largest occupation, industrial truck and tractor operators, is projected to expand by 11% over the next five years, offering 1,611 annual openings. Shipping, receiving and traffic clerks will also offer substantial annual openings, 931. The highest median wage is earned by airline pilots, copilots and flight engineers, \$88.02/hour. The lowest wage is earned by shipping, receiving and traffic clerks, \$15.16/hour. On average each year, community colleges in the region confer 19 certificates, four degrees and 20 non-credit awards related to logistics. The gap analysis reveals a shortage of 8,765 workers in the region.

## Employment & Occupational Demand

**Exhibit 60: Logistics employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Heavy and Tractor-Trailer Truck Drivers	30,581	32,859	2,278	7%	18,967	3,793
Industrial Truck and Tractor Operators	11,575	12,889	1,314	11%	8,053	1,611
Shipping, Receiving, and Traffic Clerks	8,011	8,555	544	7%	4,654	931
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	5,153	5,782	629	12%	3,390	678
Bus Drivers, School or Special Client	4,145	4,698	553	13%	3,179	636
Bus Drivers, Transit and Intercity	1,253	1,462	209	17%	1,014	203
Transportation, Storage, and Distribution Managers	1,488	1,627	139	9%	725	145
Logisticians	1,165	1,231	66	6%	639	128
Aircraft Mechanics and Service Technicians	1,363	1,382	19	1%	560	112
Painters, Transportation Equipment	690	730	40	6%	407	81
Commercial Pilots	586	643	57	10%	344	69
Transportation Attendants, Except Flight Attendants	467	489	22	5%	338	68
Cargo and Freight Agents	454	522	68	15%	266	53
Transportation Inspectors	315	342	27	9%	184	37
Railroad Conductors and Yardmasters	319	325	6	2%	159	32
Airline Pilots, Copilots, and Flight Engineers	309	312	3	1%	153	31

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Rail Car Repairers	210	225	15	7%	121	24
Locomotive Engineers	276	280	4	1%	121	24
Captains, Mates, and Pilots of Water Vessels	181	202	21	12%	118	24
Sailors and Marine Oilers	140	159	19	14%	109	22

## Wages

### Exhibit 61: Logistics wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Airline Pilots, Copilots, and Flight Engineers	\$53.47	\$88.02
Transportation, Storage, and Distribution Managers	\$32.40	\$40.83
Logisticians	\$29.43	\$38.72
Locomotive Engineers	\$28.33	\$36.67
Railroad Conductors and Yardmasters	\$28.19	\$33.43
Aircraft Mechanics and Service Technicians	\$26.76	\$30.85
Commercial Pilots	\$25.29	\$36.64
Rail Car Repairers	\$24.20	\$29.67
Captains, Mates, and Pilots of Water Vessels	\$23.72	\$31.78
Transportation Inspectors	\$20.37	\$30.56
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$19.49	\$26.45
Cargo and Freight Agents	\$16.21	\$19.92
Heavy and Tractor-Trailer Truck Drivers	\$16.04	\$18.71
Painters, Transportation Equipment	\$14.93	\$19.69
Bus Drivers, Transit and Intercity	\$14.87	\$18.90
Sailors and Marine Oilers	\$13.70	\$17.34
Bus Drivers, School or Special Client	\$13.58	\$16.41
Transportation Attendants, Except Flight Attendants	\$12.92	\$16.85
Industrial Truck and Tractor Operators	\$12.72	\$15.50
Shipping, Receiving, and Traffic Clerks	\$12.15	\$15.16
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

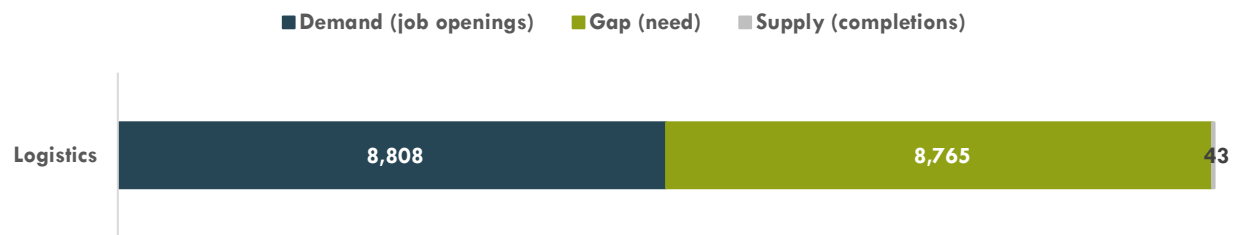
## Community College Supply

**Exhibit 62: Logistics community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	NON-CREDIT	SUBTOTAL
Aeronautical and Aviation Technology-095000	6	4		10
Aviation Airframe Mechanics-095010	5			5
Aviation Powerplant Mechanics-095020	5			5
Logistics and Materials Transportation-051000	2	0	20	23
<b>TOTAL</b>	<b>19</b>	<b>4</b>	<b>20</b>	<b>43</b>

## Gap Analysis

**Exhibit 63: Logistics annual demand and supply in the region**



# MECHANICS & WELDING

## Summary

By far, the largest mechanics and welding occupation in the region is automotive service technicians and mechanics with 8,661 workers in 2017. This occupation is projected to expand by 6%, with 924 annual openings. Welders, cutters, solderers and brazers is the second largest occupation with over 4,500 workers and is projected to undergo similar growth, 5%, offering 529 annual openings. Several occupations in this industry sector are expected to slightly decline over the next five years, with structural metal fabricators and fitters shedding the most jobs, 25 by 2022. Electrical and electronics installers and repairers (transportation equipment) earn the highest median wage, \$34.98/hour, followed by first-line supervisors of mechanics, installers and repairers, \$33.63/hour. On average each year, community colleges in the region confer 712 certificates, 117 degrees and 25 non-credit awards related to mechanics and welding. The gap analysis reveals a shortage of 2,549 workers in the region.

## Employment & Occupational Demand

**Exhibit 64: Mechanics and welding employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Automotive Service Technicians and Mechanics	8,661	9,175	514	6%	4,620	924
Welders, Cutters, Solderers, and Brazers	4,519	4,725	206	5%	2,645	529
First-Line Supervisors of Mechanics, Installers, and Repairers	4,478	4,858	380	8%	2,340	468
Bus and Truck Mechanics and Diesel Engine Specialists	3,399	3,700	301	9%	1,862	372
Machinists	1,952	2,039	87	4%	1,120	224
Mobile Heavy Equipment Mechanics, Except Engines	2,062	2,131	69	3%	1,065	213
Farm Equipment Mechanics and Service Technicians	1,464	1,600	136	9%	854	171
Automotive Body and Related Repairers	1,432	1,542	110	8%	811	162
Structural Metal Fabricators and Fitters	609	584	(25)	(4%)	328	66
Automotive Glass Installers and Repairers	339	361	22	6%	189	38
Outdoor Power Equipment and Other Small Engine Mechanics	232	251	19	8%	142	28
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	257	256	(1)	(0%)	139	28
Electric Motor, Power Tool, and Related Repairers	223	244	21	9%	129	26
Recreational Vehicle Service Technicians	188	183	(5)	(3%)	117	23
Electronic Home Entertainment Equipment Installers and Repairers	186	187	1	1%	108	22



OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Electronic Equipment Installers and Repairers, Motor Vehicles	206	189	(17)	(8%)	96	19
Electrical and Electronics Installers and Repairers, Transportation Equipment	133	140	7	5%	67	13

## Wages

### Exhibit 65: Mechanics and welding wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Electrical and Electronics Installers and Repairers, Transportation Equipment	\$27.54	\$34.98
First-Line Supervisors of Mechanics, Installers, and Repairers	\$25.30	\$33.63
Mobile Heavy Equipment Mechanics, Except Engines	\$21.16	\$26.50
Electric Motor, Power Tool, and Related Repairers	\$19.42	\$25.62
Bus and Truck Mechanics and Diesel Engine Specialists	\$17.12	\$22.50
Recreational Vehicle Service Technicians	\$16.19	\$18.59
Electronic Home Entertainment Equipment Installers and Repairers	\$15.97	\$17.23
Structural Metal Fabricators and Fitters	\$15.90	\$19.79
Welders, Cutters, Solderers, and Brazers	\$15.62	\$18.74
Machinists	\$14.85	\$19.15
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	\$14.37	\$17.14
Farm Equipment Mechanics and Service Technicians	\$14.24	\$18.71
Automotive Body and Related Repairers	\$13.43	\$18.92
Electronic Equipment Installers and Repairers, Motor Vehicles	\$12.58	\$15.94
Automotive Glass Installers and Repairers	\$12.33	\$13.66
Outdoor Power Equipment and Other Small Engine Mechanics	\$11.99	\$16.15
Automotive Service Technicians and Mechanics	\$11.55	\$16.06
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

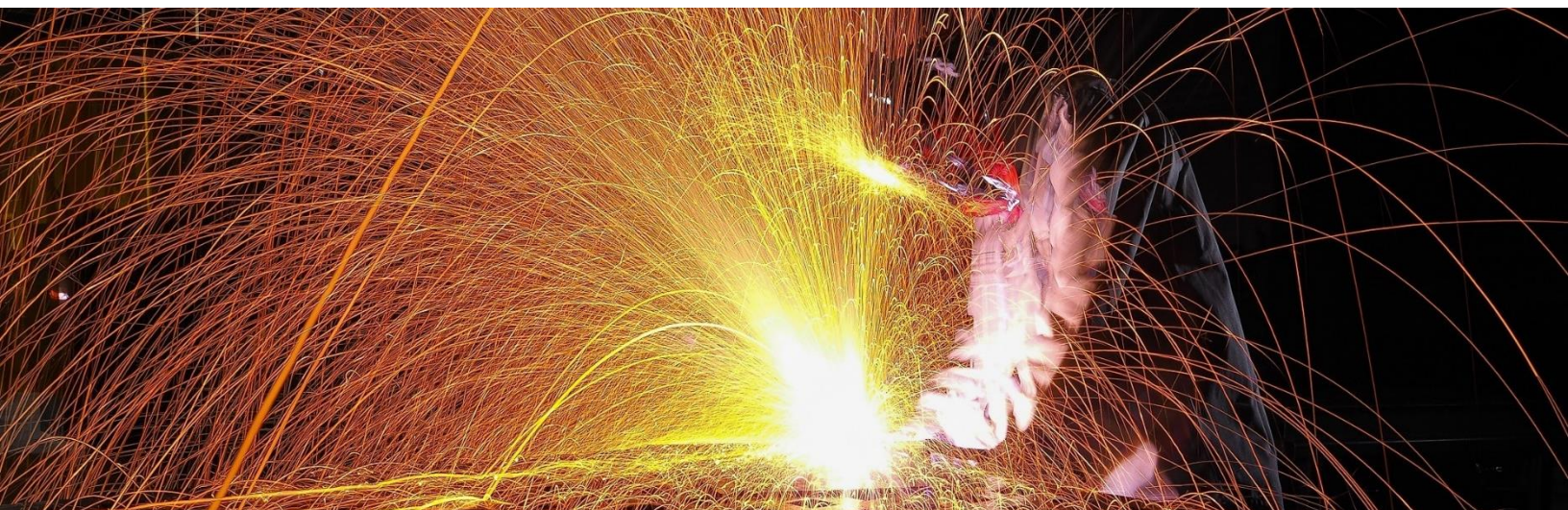
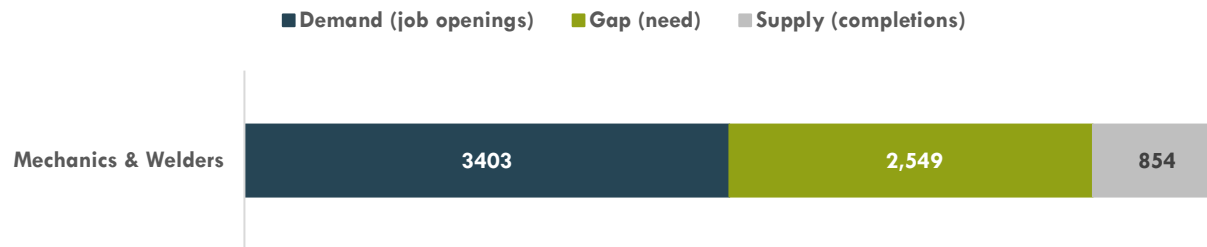
## Community College Supply

**Exhibit 66: Mechanics and welding community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	NON-CREDIT	SUBTOTAL
Agricultural Power Equipment Technology-011600	183	12		195
Automotive Collision Repair-094900	53	4	12	70
Automotive Technology-094800	240	47	12	299
Diesel Technology-094700	9	1		10
Heavy Equipment Maintenance-094720	7	23		30
Heavy Equipment Operation-094730	6			6
Sheet Metal and Structural Metal-095640	6			6
Machining and Machine Tools-095630	55	4		59
Welding Technology-095650	152	27		179
<b>TOTAL</b>	<b>712</b>	<b>117</b>	<b>25</b>	<b>854</b>

## Gap Analysis

**Exhibit 67: Mechanics and welding annual demand and supply in the region**



# PROTECTIVE SERVICES

## Summary

Correctional officers and jailers comprise the largest protective services occupation in the region, with nearly 12,800 workers in 2017. With 5% growth projected, this occupation will offer 1,195 annual openings. The second largest occupation is police and sheriff's patrol officers, which will have more robust growth, 8%, translating to 585 annual openings. The highest paid occupation is first-line supervisors of police and detectives, \$68.54/hour, followed by first-line supervisors of correctional officers, \$48.48/hour. On average each year, community colleges in the region confer 532 certificates and 771 degrees related to protective services. The gap analysis reveals a shortage of 2,181 workers in the region.

## Employment & Occupational Demand

**Exhibit 68: Protective services employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Correctional Officers and Jailers	12,784	13,447	663	5%	5,973	1,195
Police and Sheriff's Patrol Officers	7,119	7,702	583	8%	2,927	585
Protective Service Workers, All Other	1,933	2,109	176	9%	2,636	527
Firefighters	3,826	4,094	268	7%	1,557	311
Police, Fire, and Ambulance Dispatchers	994	1,083	89	9%	549	110
First-Line Supervisors of Correctional Officers	1,400	1,472	72	5%	547	109
Private Detectives and Investigators	661	695	34	5%	358	72
Detectives and Criminal Investigators	751	839	88	12%	334	67
First-Line Supervisors of Police and Detectives	778	863	85	11%	327	65
First-Line Supervisors of Protective Service Workers, All Other	505	546	41	8%	295	59
First-Line Supervisors of Fire Fighting and Prevention Workers	370	406	36	10%	162	32
Gaming Surveillance Officers and Gaming Investigators	204	220	16	8%	153	31
Animal Control Workers	202	215	13	6%	122	24
Forensic Science Technicians	144	171	27	19%	116	23

## Wages

**Exhibit 69: Protective services wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
First-Line Supervisors of Police and Detectives	\$53.32	\$68.54
First-Line Supervisors of Correctional Officers	\$45.12	\$48.48
First-Line Supervisors of Fire Fighting and Prevention Workers	\$36.18	\$46.02
Detectives and Criminal Investigators	\$33.35	\$43.00
Correctional Officers and Jailers	\$30.49	\$40.14
Police and Sheriff's Patrol Officers	\$28.86	\$36.39
Firefighters	\$22.60	\$28.55
Private Detectives and Investigators	\$21.63	\$33.20
Police, Fire, and Ambulance Dispatchers	\$20.33	\$25.29
Forensic Science Technicians	\$20.26	\$25.37
Gaming Surveillance Officers and Gaming Investigators	\$19.63	\$23.02
First-Line Supervisors of Protective Service Workers, All Other	\$19.29	\$26.78
Animal Control Workers	\$15.42	\$19.52
Protective Service Workers, All Other	\$13.30	\$16.76
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

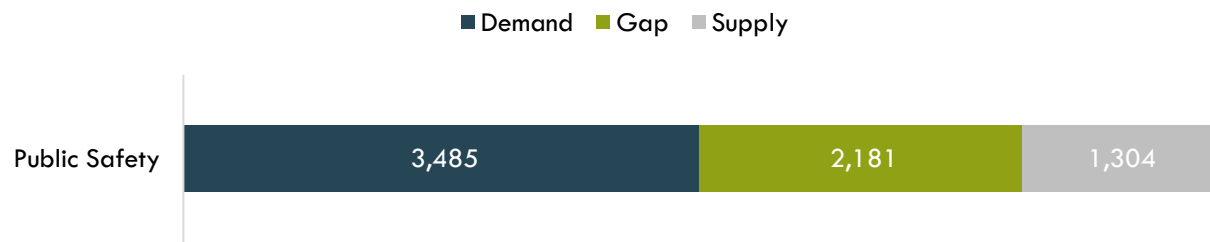
## Community College Supply

**Exhibit 70: Protective services community college supply**

TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Administration of Justice-210500	74	642	716
Corrections-210510	13	42	55
Fire Academy-213350	89		89
Fire Technology-213300	46	79	125
Forensics, Evidence, and Investigation-210540	4	4	8
Police Academy-210550	292	2	294
Wildland Fire Technology-213310	15	2	17
<b>TOTAL</b>	<b>532</b>	<b>771</b>	<b>1,304</b>

## Gap Analysis

**Exhibit 71: Protective services annual demand and supply in the region**





# RETAIL, HOSPITALITY, TOURISM & ENTERTAINMENT

## Summary

The analysis of the retail, hospitality, tourism and entertainment industry broke the industry into two subsectors: retail as the first sector, and hospitality, tourism and entertainment as the second sector. The largest retail occupation is customer service representatives with 15,584 workers in 2017. This occupation is projected to increase robustly at 10%, offering 2,352 annual openings. The largest occupation in hospitality, tourism and entertainment is cooks (restaurant) with nearly 9,000 workers in 2017. With a strong growth projection of 10%, this occupation will offer 1,471 annual openings.

The highest paid retail occupation is interior designers with a median wage of \$20.97/hour. The highest paid hospitality, tourism and entertainment occupation is interpreters and translators with a median wage of \$22.11/hour.

On average each year, community colleges in the region confer 31 certificates and 31 degrees related to retail. The gap analysis reveals a shortage of 6,691 retail-related workers in the region. By comparison, community colleges in the region confer 173 certificates, 101 degrees and seven non-credit awards related to hospitality, tourism and entertainment. The gap analysis reveals a shortage of 5,673 workers for the hospitality, tourism and entertainment industry in the region.

## Employment & Occupational Demand

### Exhibit 72: Retail employment and occupational projections

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017-2022 OPENINGS	ANNUAL OPENINGS
Customer Service Representatives	15,584	17,065	1,481	10%	11,760	2,352
First-Line Supervisors of Retail Sales Workers	14,731	15,328	597	4%	8,764	1,753
Hairdressers, Hairstylists, and Cosmetologists	6,682	7,379	697	10%	4,799	960
Manicurists and Pedicurists	2,637	2,927	290	11%	1,831	366
First-Line Supervisors of Personal Service Workers	2,439	2,778	339	14%	1,583	317
Demonstrators and Product Promoters	1,272	1,314	42	3%	1,156	231
Merchandise Displayers and Window Trimmers	1,126	1,216	90	8%	629	126
Skincare Specialists	632	706	74	12%	444	89
Barbers	721	804	83	12%	428	86
Advertising Sales Agents	636	580	(56)	(9%)	385	77
Security and Fire Alarm Systems Installers	513	579	66	13%	369	74

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
First-Line Supervisors of Gaming Workers	421	442	21	5%	358	72
Funeral Attendants	363	379	16	4%	295	59
Interior Designers	536	554	18	3%	278	56
Floral Designers	532	510	(22)	(4%)	246	49
Home Appliance Repairers	328	359	31	9%	193	39
Locksmiths and Safe Repairers	275	280	5	2%	143	29
Morticians, Undertakers, and Funeral Directors	158	166	8	5%	109	22

**Exhibit 73: Hospitality, tourism and entertainment employment and occupational projections**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017- 2022 OPENINGS	ANNUAL OPENINGS
Cooks, Restaurant	8,929	9,785	856	10%	7,356	1,471
First-Line Supervisors of Food Preparation and Serving Workers	8,137	9,057	920	11%	6,941	1,388
Cooks, Institution and Cafeteria	3,656	4,013	357	10%	3,025	605
Fitness Trainers and Aerobics Instructors	2,934	3,251	317	11%	2,868	574
Food Service Managers	3,983	4,185	202	5%	2,374	475
Bakers	1,925	2,038	113	6%	1,506	301
Butchers and Meat Cutters	2,056	2,179	123	6%	1,407	281
First-Line Supervisors of Housekeeping and Janitorial Workers	1,705	1,880	175	10%	1,169	234
Chefs and Head Cooks	1,268	1,375	107	8%	922	184
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	1,671	1,742	71	4%	868	174
Interpreters and Translators	969	1,055	86	9%	536	107
Meeting, Convention, and Event Planners	669	740	71	11%	469	94
Photographers	948	958	10	1%	436	87
Audio and Video Equipment Technicians	766	818	52	7%	408	82
Lodging Managers	577	569	(8)	(1%)	309	62
Travel Agents	250	261	11	4%	172	34
Entertainers and Performers, Sports and Related Workers, All Other	214	222	8	4%	124	25
Cooks, All Other	146	163	17	12%	124	25
Broadcast Technicians	217	231	14	6%	119	24
Radio and Television Announcers	241	222	(19)	(8%)	118	24



## Wages

### Exhibit 74: Retail wages

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Interior Designers	\$18.75	\$20.97
Security and Fire Alarm Systems Installers	\$17.11	\$20.61
Morticians, Undertakers, and Funeral Directors	\$17.02	\$20.68
Locksmiths and Safe Repairers	\$15.15	\$19.07
Advertising Sales Agents	\$13.56	\$20.76
First-Line Supervisors of Retail Sales Workers	\$13.19	\$16.10
First-Line Supervisors of Personal Service Workers	\$13.11	\$17.23
Home Appliance Repairers	\$12.56	\$14.33
Customer Service Representatives	\$12.24	\$16.41
Skincare Specialists	\$12.04	\$13.93
First-Line Supervisors of Gaming Workers	\$11.80	\$12.61
Hairdressers, Hairstylists, and Cosmetologists	\$11.65	\$11.89
Merchandise Displayers and Window Trimmers	\$11.51	\$14.19
Demonstrators and Product Promoters	\$11.41	\$12.81
Funeral Attendants	\$11.27	\$13.17
Floral Designers	\$10.51	\$11.78
Manicurists and Pedicurists	\$10.50	\$11.02
Barbers	\$10.08	\$10.48
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		



**Exhibit 75: Hospitality, tourism and entertainment wages**

OCCUPATION	PCT. 25 HOURLY EARNINGS*	MEDIAN HOURLY EARNINGS
Interpreters and Translators	\$18.30	\$22.11
Meeting, Convention, and Event Planners	\$16.95	\$20.97
Entertainers and Performers, Sports and Related Workers, All Other	\$16.87	\$20.14
Lodging Managers	\$15.50	\$21.68
Audio and Video Equipment Technicians	\$15.13	\$19.00
Fitness Trainers and Aerobics Instructors	\$14.89	\$21.09
Radio and Television Announcers	\$14.52	\$19.56
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	\$14.25	\$16.12
Photographers	\$14.23	\$16.70
Chefs and Head Cooks	\$13.64	\$18.78
First-Line Supervisors of Housekeeping and Janitorial Workers	\$13.38	\$15.99
Travel Agents	\$13.23	\$14.92
Cooks, Institution and Cafeteria	\$12.52	\$14.87
Cooks, All Other	\$12.42	\$14.41
Broadcast Technicians	\$12.09	\$16.97
First-Line Supervisors of Food Preparation and Serving Workers	\$11.94	\$14.29
Butchers and Meat Cutters	\$11.73	\$14.25
Cooks, Restaurant	\$11.32	\$12.87
Bakers	\$11.25	\$12.91
Food Service Managers	\$11.21	\$16.93
*Due to fluctuations in 10 <sup>th</sup> percentile wages, 25 <sup>th</sup> percentile wages have been used to describe entry-level wages.		

**Community College Supply****Exhibit 76: Retail community college supply**

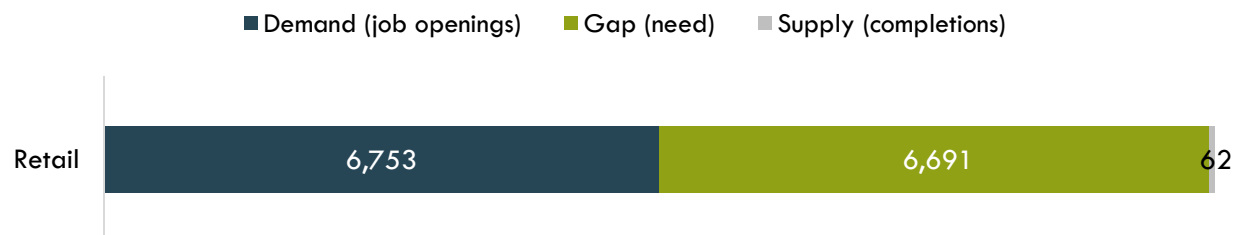
TOP TITLE-CODE	CERTIFICATE	DEGREE	SUBTOTAL
Retail Store Operations and Management-050650	24	17	41
Interior Design and Merchandising-130200	2	6	8
Fashion Merchandising-130320	5	7	13
<b>TOTAL</b>	<b>31</b>	<b>31</b>	<b>62</b>

### Exhibit 77: Hospitality, tourism and entertainment community college supply

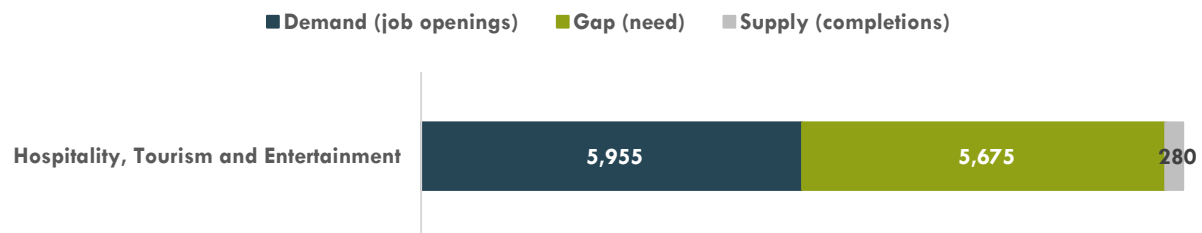
TOP TITLE-CODE	CERTIFICATE	DEGREE	OTHER CREDIT	SUBTOTAL
Applied Photography-101200	27	5		32
Fitness Trainer-083520	5			5
Recreation Assistant-083610	0			0
Recreation-083600		4		4
Sign Language Interpreting-085010	2			2
Commercial Art-101300	0	0		1
Commercial Music-100500	5	4		9
Culinary Arts-130630	43	32		75
Dance-100800		5		5
Dietetic Services and Management-130620	9	1		10
Dramatic Arts-100700	1	32		33
Fashion Design-130310	5	5		10
Hospitality-130700	1			1
Resort and Club Management-130730		2		2
Restaurant and Food Services and Management-130710	72	5	7	84
Technical Theater-100600	2	3		5
Nutrition, Foods, and Culinary Arts-130600	0	2		2
<b>TOTAL</b>	<b>173</b>	<b>101</b>	<b>7</b>	<b>280</b>

### Gap Analysis

#### Exhibit 78: Retail annual supply and demand in the region



#### Exhibit 79: Hospitality, tourism and entertainment annual demand and supply in the region



# CONCLUSION & RECOMMENDATIONS

The Central Valley/Northern Mother Lode's population totaled more than 4.2 million residents in 2017 and is projected to add more than 141,000 new residents by 2022. This study focused on eleven sectors and one occupational grouping:

- Agriculture, water and environmental technologies;
- Advanced manufacturing;
- Business;
- Energy, construction and utilities (ECU);
- Education
- Global trade;
- Health care;
- ICT/digital media;
- Logistics;
- Mechanics and welding;
- Protective services; and
- Retail, hospitality, tourism and entertainment.

After the redistribution of occupations in the government sector, collectively, the 12 industry sectors employ more than 1.7 million workers and are projected to offer more than 128,000 new jobs by 2022 in the Central Valley/Mother Lode Region. Of the industries analyzed, health care and social services accounts for 16% of projected job growth by 2022 in the region.

The business sector accounts for 27% of the current five-year gap in supply. When global trade and retail, which are subsets of the business sector, are added the total business percentage of the gap jumps to 36%. Community colleges are strongly encouraged to increase the completion rates of business students and agriculture business students. It is recommended that the community colleges also direct attention toward two other sectors with a substantial projected gap in supply: energy, construction and utilities; and logistics.

Across all sectors, first-line supervisors account for a substantial number of jobs that are well paid and projected to grow in coming years. Supervisors are typically required to possess less than a bachelor's degree and can obtain training provided by most community colleges in the region. Positions with the greatest number of annual openings include:

- First-Line Supervisors of Retail Sales Workers,
- First-Line Supervisors of Office and Administrative Support Workers,
- First-Line Supervisors of Food Preparation and Serving Workers, and
- First-Line Supervisors of Farming, Fishing, and Forestry Workers.

Central Valley/Mother Lode Community colleges need to remain mindful of the rapid expansion that the health care sector is undergoing over the next five years and should work on a strategic plan to increase capacity for nursing programs. Other strategic plan initiatives need to focus on middle-skill occupations in the following sectors where substantial job growth is expected to occur: business; retail, hospitality, tourism and entertainment; energy, construction and utilities; and logistics.

**Exhibit 80: First-line supervisors employment and occupational projections, all 12 industries**

OCCUPATION	2017	2022	5-YR CHANGE	5-YR % CHANGE	2017-2022 OPENINGS	ANNUAL OPENINGS
First-Line Supervisors of Retail Sales Workers	14,731	15,328	597	4%	8,764	1,753
First-Line Supervisors of Office and Administrative Support Workers	13,775	14,604	829	6%	7,710	1,542
First-Line Supervisors of Food Preparation and Serving Workers	8,137	9,057	920	11%	6,941	1,388
First-Line Supervisors of Farming, Fishing, and Forestry Workers	5,445	5,788	343	6%	4,043	809
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	5,153	5,782	629	12%	3,390	678
First-Line Supervisors of Production and Operating Workers	5,918	6,261	343	6%	3,272	654
First-Line Supervisors of Construction Trades and Extraction Workers	5,837	5,970	133	2%	3,148	630
First-Line Supervisors of Mechanics, Installers, and Repairers	4,478	4,858	380	8%	2,340	468
First-Line Supervisors of Personal Service Workers	2,439	2,778	339	14%	1,583	317
First-Line Supervisors of Non-Retail Sales Workers	2,913	3,050	137	5%	1,469	294
First-Line Supervisors of Housekeeping and Janitorial Workers	1,705	1,880	175	10%	1,169	234
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	1,671	1,742	71	4%	868	174
First-Line Supervisors of Gaming Workers	421	442	21	5%	358	72
First-Line Supervisors of Police and Detectives	778	863	85	11%	327	65
First-Line Supervisors of Protective Service Workers, All Other	505	546	41	8%	295	59
First-Line Supervisors of Fire Fighting and Prevention Workers	370	406	36	10%	162	32
<b>TOTAL</b>	<b>74,276</b>	<b>79,355</b>	<b>5,079</b>	<b>7%</b>	<b>45,839</b>	<b>9,169</b>

## Key Findings and Recommendations:

- **AGRICULTURE, WATER & ENVIRONMENTAL TECHNOLOGIES**—Community college programs focusing on agriculture and the life sciences may want to tailor programs toward business occupations in the region that will be adding the most jobs over the next five years. Occupations with the highest number of annual openings include farmers, ranchers and other agricultural managers; agricultural equipment operators; and first-line supervisors of farming, fishing and forestry workers. This industry has a supply gap of 4,600 workers.
- **ADVANCED MANUFACTURING**—Occupations with the most annual openings include packaging and filling machine operators and tenders, 1,242 openings, and first-line supervisors of production and operating workers, 654 openings. This industry has a supply gap of 5,300 workers.
- **BUSINESS**—This industry sector has the largest projected workforce demand of all the industries studied. Community colleges should consider expanding program capacity to increase the number of students completing business programs in the region. The gap analysis reveals a shortage of 22,869 workers in the region. Office clerks (general) is projected to offer 3,784 annual openings; secretaries and administration assistants (except legal, medical and executive), 2,510 annual openings; and bookkeeping, accounting and auditing clerks, 1,964 annual openings.
- **ENERGY, CONSTRUCTION & UTILITIES**—Community colleges may want to evaluate whether current program capacity is sufficient for training students to enter the ECU industry's largest occupation, maintenance and repair workers (general) with more than 15,105 workers in the region in 2017. This occupation is projected to undergo moderate growth, 8%, and offer 1,746 annual openings in the region. The following two occupations with the most annual openings are in the skilled trades—carpenters, 935 annual openings, and electricians, 684 annual openings. The gap analysis reveals an annual shortage of 10,056 workers in the region.
- **EDUCATION**—Teacher assistants comprise the largest education occupation in the region, with more than 21,700 workers in 2017. There are projected to be 2,701 annual openings for teacher assistants. Childcare workers, the second largest occupation, is expected to decline by 7% over the next five years, although it will still offer 2,020 annual openings. The gap analysis reveals a shortage of 5,476 workers in the region.
- **GLOBAL TRADE**—Global trade has one of the smallest supply gaps of the industries studied. Two occupations make up the bulk of employment—buyers and purchasing agents, cost estimators and administrative services managers. Buyers and purchasing agents is projected to have 340 annual openings. Cost estimators is expected to have 273 annual openings. The gap analysis reveals a shortage of 788 workers in the region.
- **HEALTH CARE**—Almost all the health care occupations analyzed for this study show robust growth projections over the next five years. The top three largest health care occupations are registered nurses, nursing assistants and medical assistants. As with the business sector, community colleges in the region may want to evaluate whether existing programs are adequate to meet workforce demand in the region. The gap analysis reveals a substantial health care labor shortage, 9,783 workers in the region.
- **ICT/DIGITAL MEDIA**—ICT/digital media is the smallest of the industries studied. The largest occupation is computer user support specialists with 315 annual openings. Graphic designers, the second largest occupation, will offer only 163 annual openings. The gap analysis reveals a shortage of 709 workers in the region.
- **LOGISTICS**—The logistics industry merits attention by the community colleges. This industry will offer a substantial number of annual openings over the next five years and is also facing a severe

workforce shortage. The three largest occupations are heavy and tractor-trailer truck drivers, 3,793 annual openings, industrial truck and tractor operators, 1,611 annual openings, and shipping, receiving and traffic clerks, 931 annual openings. The gap analysis reveals a shortage of 8,765 workers in the region.

- **MECHANICS & WELDING**—Most occupations in the mechanics and welding industry are projected to undergo moderate growth over the next five years. The largest occupation in the region, automotive service technicians and mechanics will have 924 annual openings. Welders, cutters, solderers and brazers is projected to offer 529 annual openings. The gap analysis reveals a shortage of 2,549 workers in the region.
- **PROTECTIVE SERVICES**—Correctional officers and jailers comprise the largest protective services occupation in the region, with nearly 12,800 workers in 2017. With 5% growth projected, this occupation will offer 1,195 annual openings. The second largest occupation is police and sheriff's patrol officers; this occupation will have 585 annual openings. The gap analysis reveals a shortage of 2,181 workers in the region.
- **RETAIL, HOSPITALITY, TOURISM & ENTERTAINMENT**—The analysis of the retail, hospitality, tourism and entertainment industry shows that this industry employs the greatest number of workers in the region, and after the business sector, offers the second greatest number of new jobs. The largest retail occupation is customer service representatives with 15,584 workers and 2,352 annual openings projected. The largest occupation in hospitality, tourism and entertainment is cooks (restaurant) with nearly 9,000 workers and 1,471 annual openings. The gap analysis reveals a combined shortage of 12,366 retail-related workers and workers in hospitality, tourism and entertainment.



# APPENDIX A: METHODOLOGY & DATA SOURCES

## DATA SOURCES

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor's Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

DATA TYPE	SOURCE
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: <a href="http://economicmodeling.com">economicmodeling.com</a> .
Living Wage	A living wage calculator that estimates the cost of living in a specific community or subregion: <a href="http://livingwage.mit.edu">livingwage.mit.edu</a> .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: <a href="http://www.bls.gov/emp/ep_education_tech.htm">www.bls.gov/emp/ep_education_tech.htm</a> .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, <a href="http://labormarketinfo.edd.ca.gov">labormarketinfo.edd.ca.gov</a>
Job Posting and Skills Data	Burning Glass, <a href="http://www.burning-glass.com/">http://www.burning-glass.com/</a>
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledges, work activities and interests associated with specific occupations: <a href="http://www.onetonline.org">www.onetonline.org</a>

## KEY TERMS AND CONCEPTS

**Annual Job Openings:** Annual openings are calculated by dividing the number of years in the projection period by total job openings.

**Education Attainment Level:** The highest education attainment level of workers age 25 years or older.

**Employment Estimate:** The total number of workers currently employed.

**Employment Projections:** Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

**Living Wage:** The cost of living in a specific community or subregion for one adult and no children. The cost increases with the addition of children.

**Occupation:** An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

**Percent Change:** Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

**Replacements:** Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

**Total Job Openings (New + Replacements):** Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs or retain the current employment level, number of openings will equal replacements.

**Typical Education Requirement:** represents the typical education level most workers need to enter an occupation.

**Typical On-The-Job Training:** indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

**Wages Family Compositions:** The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).

# APPENDIX B: TYPICAL EDUCATION, TRAINING AND EXPERIENCE FOR OCCUPATIONS IN ALL INDUSTRIES

**Exhibit 1B: Agriculture, water and environmental technologies educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Farmers, Ranchers, and Other Agricultural Managers	High school diploma or equivalent	5 years or more	None	28.9%
Agricultural Equipment Operators	No formal educational credential	None	Moderate-term	12.7%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	22.8%
Compliance Officers	Bachelor's degree	None	Moderate-term	28.3%
Pest Control Workers	High school diploma or equivalent	None	Moderate-term	39%
Forest and Conservation Technicians	Associate degree	None	None	33.9%
Veterinary Assistants and Laboratory Animal Caretakers	High school diploma or equivalent	None	Short-term	47.1%
Agricultural Inspectors	Bachelor's degree	None	Moderate-term	28.7%
Water and Wastewater Treatment Plant and System Operators	High school diploma or equivalent	None	Long-term	45.4%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	19.7%
Veterinary Technologists and Technicians	Associate degree	None	None	56.4%
Animal Trainers	High school diploma or equivalent	None	Moderate-term	35.4%
Agricultural and Food Science Technicians	Associate degree	None	Moderate-term	36.3%
Forest and Conservation Workers	High school diploma or equivalent	None	Moderate-term	31.3%
Life, Physical, and Social Science Technicians, All Other	Associate degree	None	None	33.9%
Logging Equipment Operators	High school diploma or equivalent	None	Moderate-term	14.9%
Food Scientists and Technologists	Bachelor's degree	None	None	18.9%
Animal Breeders	High school diploma or equivalent	None	Short-term	12.7%

**Exhibit 2B: Advanced manufacturing educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Packaging and Filling Machine Operators and Tenders	High school diploma or equivalent	None	Moderate-term	18.6%
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	Less than 5 years	None	35.3%
Inspectors, Testers, Sorters, Samplers, and Weighers	High school diploma or equivalent	None	Moderate-term	37.7%
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term	41.7%
Production, Planning, and Expediting Clerks	High school diploma or equivalent	None	Moderate-term	40.1%
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	40.7%
Mixing and Blending Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	27.1%
Maintenance Workers, Machinery	High school diploma or equivalent	None	Long-term	34.5%
Industrial Production Managers	Bachelor's degree	5 years or more	None	32.7%
Electrical and Electronics Engineering Technicians	Associate degree	None	None	55.1%
Sawing Machine Setters, Operators, and Tenders, Wood	High school diploma or equivalent	None	Moderate-term	18.7%
Engineering Technicians, Except Drafters, All Other	Associate degree	None	None	55.1%
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	High school diploma or equivalent	None	Moderate-term	16.6%
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	27.9%
Computer-Controlled Machine Tool Operators, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	43.6%
Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	26.8%
Conveyor Operators and Tenders	No formal educational credential	None	Short-term	27.3%
Molders, Shapers, and Casters, Except Metal and Plastic	High school diploma or equivalent	None	Long-term	24.4%
Chemical Equipment Operators and Tenders	High school diploma or equivalent	None	Moderate-term	40.7%
Petroleum Pump System Operators, Refinery Operators, and Gaugers	High school diploma or equivalent	None	Moderate-term	44%

**Exhibit 3B: Business educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
General and Operations Managers	Bachelor's degree	5 years or more	None	34.8%
Business Operations Specialists, All Other	Bachelor's degree	None	None	27.9%
Executive Secretaries and Executive Administrative Assistants	High school diploma or equivalent	Less than 5 years	None	47.5%
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Less than 5 years	None	40.8%
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	High school diploma or equivalent	None	Moderate-term	31.6%
Real Estate Sales Agents	High school diploma or equivalent	None	Moderate-term	37.9%
Eligibility Interviewers, Government Programs	High school diploma or equivalent	None	Moderate-term	38.4%
Payroll and Timekeeping Clerks	High school diploma or equivalent	None	Moderate-term	51.3%
First-Line Supervisors of Non-Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	32.2%
Sales Representatives, Services, All Other	High school diploma or equivalent	None	Moderate-term	34.3%
Bookkeeping, Accounting, and Auditing Clerks	Some college, no degree	None	Moderate-term	48.8%
Information and Record Clerks, All Other	High school diploma or equivalent	None	Short-term	51.5%
Insurance Sales Agents	High school diploma or equivalent	None	Moderate-term	35.6%
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High school diploma or equivalent	None	Short-term	47.5%
Insurance Claims and Policy Processing Clerks	High school diploma or equivalent	None	Moderate-term	46.5%
Billing and Posting Clerks	High school diploma or equivalent	None	Moderate-term	49.6%
Office Clerks, General	High school diploma or equivalent	None	Short-term	45.6%
Receptionists and Information Clerks	High school diploma or equivalent	None	Short-term	46.1%
Tellers	High school diploma or equivalent	None	Short-term	44.5%
Office and Administrative Support Workers, All Other	High school diploma or equivalent	None	Short-term	42.7%

**Exhibit 4B: Energy, construction and utilities educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Maintenance and Repair Workers, General	High school diploma or equivalent	None	Moderate-term	38.2%
Carpenters	High school diploma or equivalent	None	Apprenticeship	25.9%
Electricians	High school diploma or equivalent	None	Apprenticeship	47.3%
First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent	5 years or more	None	32.8%
Plumbers, Pipefitters, and Steamfitters	High school diploma or equivalent	None	Apprenticeship	31.4%
Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent	None	Moderate-term	24.3%
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Postsecondary nondegree award	None	Long-term	43.9%
Painters, Construction and Maintenance	No formal educational credential	None	Moderate-term	20.5%
Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary nondegree award	None	Moderate-term	52.8%
Cement Masons and Concrete Finishers	No formal educational credential	None	Moderate-term	15.2%
Construction Managers	Bachelor's degree	None	Moderate-term	32.8%
Installation, Maintenance, and Repair Workers, All Other	High school diploma or equivalent	None	Moderate-term	35%
Roofers	No formal educational credential	None	Moderate-term	13.7%
Drywall and Ceiling Tile Installers	No formal educational credential	None	Moderate-term	15.4%
Sheet Metal Workers	High school diploma or equivalent	None	Apprenticeship	34.4%
Service Unit Operators, Oil, Gas, and Mining	No formal educational credential	None	Moderate-term	28.8%
Solar Photovoltaic Installers	High school diploma or equivalent	None	Moderate-term	28%
Cabinetmakers and Bench Carpenters	High school diploma or equivalent	None	Moderate-term	25.7%
Telecommunications Line Installers and Repairers	High school diploma or equivalent	None	Long-term	47.2%
Plasterers and Stucco Masons	No formal educational credential	None	Long-term	14.5%

**Exhibit 5B: Educational attainment in the education sector**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Teacher Assistants	Some college, no degree	None	None	43.7%
Childcare Workers	High school diploma or equivalent	None	Short-term	36.7%
Preschool Teachers, Except Special Education	Associate degree	None	None	37.8%
Self-Enrichment Education Teachers	High school diploma or equivalent	Less than 5 years	None	26.7%
Kindergarten Teachers, Except Special Education	Bachelor's degree	None	None	37.8%
Training and Development Specialists	Bachelor's degree	Less than 5 years	None	33.7%
Library Technicians	Postsecondary nondegree award	None	None	26.1%
Library Assistants, Clerical	High school diploma or equivalent	None	Short-term	37.6%
Career/Technical Education Teachers, Secondary School	Bachelor's degree	Less than 5 years	None	4.8%
Education Administrators, Preschool and Childcare Center/Program	Bachelor's degree	Less than 5 years	None	13%
Special Education Teachers, Preschool	Bachelor's degree	None	None	9.7%
Social Science Research Assistants	Bachelor's degree	None	None	33.9%

**Exhibit 6B: Global trade educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Buyers and Purchasing Agents	Bachelor's degree	None	Moderate-term	32.9%
Cost Estimators	Bachelor's degree	None	Moderate-term	40.8%
Administrative Services Managers	Bachelor's degree	Less than 5 years	None	42%
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Bachelor's degree	None	Moderate-term	31.6%
Brokerage Clerks	High school diploma or equivalent	None	Moderate-term	36.8%



**Exhibit 7B: Health care educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Dental Assistants	Postsecondary nondegree award	None	None	58.3%
Dental Hygienists	Associate degree	None	None	60.8%
Emergency Medical Technicians and Paramedics	Postsecondary nondegree award	None	None	68.3%
Home Health Aides	High school diploma or equivalent	None	Short-term	41.7%
Licensed Practical and Licensed Vocational Nurses	Postsecondary nondegree award	None	None	74.1%
Medical Assistants	Postsecondary nondegree award	None	None	65%
Medical Records and Health Information Technicians	Postsecondary nondegree award	None	None	54.9%
Medical Secretaries	High school diploma or equivalent	None	Moderate-term	47.5%
Nursing Assistants	Postsecondary nondegree award	None	None	41.7%
Pharmacy Aides	High school diploma or equivalent	None	Short-term	50.3%
Pharmacy Technicians	High school diploma or equivalent	None	Moderate-term	56.4%
Phlebotomists	Postsecondary nondegree award	None	None	61.1%
Physical Therapist Aides	High school diploma or equivalent	None	Short-term	70.9%
Physical Therapist Assistants	Associate degree	None	None	70.9%
Psychiatric Technicians	Postsecondary nondegree award	Less than 5 years	Short-term	56.4%
Radiologic Technologists	Associate degree	None	None	66.1%
Registered Nurses	Bachelor's degree	None	None	42.1%
Respiratory Therapists	Associate degree	None	None	69.9%
Social and Human Service Assistants	High school diploma or equivalent	None	Short-term	40%
Surgical Technologists	Postsecondary nondegree award	None	None	56.4%

**Exhibit 8B: Hospitality, tourism and entertainment educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Cooks, Restaurant	No formal educational credential	Less than 5 years	Moderate-term	23.4%
First-Line Supervisors of Food Preparation and Serving Workers	High school diploma or equivalent	Less than 5 years	None	37.9%
Cooks, Institution and Cafeteria	No formal educational credential	None	Short-term	23.4%
Fitness Trainers and Aerobics Instructors	High school diploma or equivalent	None	Short-term	34.1%
Food Service Managers	High school diploma or equivalent	Less than 5 years	None	37.7%
Bakers	No formal educational credential	None	Long-term	27.8%
Butchers and Meat Cutters	No formal educational credential	None	Long-term	20.5%
First-Line Supervisors of Housekeeping and Janitorial Workers	High school diploma or equivalent	Less than 5 years	None	35.2%
Chefs and Head Cooks	High school diploma or equivalent	5 years or more	None	39.4%
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	High school diploma or equivalent	Less than 5 years	None	32.9%
Interpreters and Translators	Bachelor's degree	None	None	36%
Meeting, Convention, and Event Planners	Bachelor's degree	None	None	24.9%
Photographers	High school diploma or equivalent	None	Long-term	33%
Audio and Video Equipment Technicians	Postsecondary nondegree award	None	Short-term	44.6%
Lodging Managers	High school diploma or equivalent	Less than 5 years	None	33.4%
Travel Agents	High school diploma or equivalent	None	Moderate-term	44.2%
Entertainers and Performers, Sports and Related Workers, All Other	No formal educational credential	None	Short-term	36.5%
Cooks, All Other	No formal educational credential	None	Moderate-term	23.4%
Broadcast Technicians	Associate degree	None	Short-term	44.6%
Radio and Television Announcers	Bachelor's degree	None	None	42%

**Exhibit 9B: ICT/digital media educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Computer User Support Specialists	Some college, no degree	None	None	45.2%
Graphic Designers	Bachelor's degree	None	None	30.3%
Computer Occupations, All Other	Bachelor's degree	None	None	36.9%
Network and Computer Systems Administrators	Bachelor's degree	None	None	39.5%
Computer Network Support Specialists	Associate degree	None	None	45.2%
Computer, Automated Teller, and Office Machine Repairers	Some college, no degree	None	Short-term	53.1%
Web Developers	Associate degree	None	None	27.2%
Surveying and Mapping Technicians	High school diploma or equivalent	None	Moderate-term	58.5%
Medical Equipment Repairers	Associate degree	None	Moderate-term	54.4%
Computer Network Architects	Bachelor's degree	5 years or more	None	37%
Media and Communication Equipment Workers, All Other	High school diploma or equivalent	None	Short-term	44.6%

**Exhibit 10B: Logistics educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Heavy and Tractor-Trailer Truck Drivers	Postsecondary nondegree award	None	Short-term	28.3%
Industrial Truck and Tractor Operators	No formal educational credential	None	Short-term	24.2%
Shipping, Receiving, and Traffic Clerks	High school diploma or equivalent	None	Short-term	32.9%
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	High school diploma or equivalent	Less than 5 years	None	38.1%
Bus Drivers, School or Special Client	High school diploma or equivalent	None	Short-term	36.1%
Bus Drivers, Transit and Intercity	High school diploma or equivalent	None	Moderate-term	36.1%
Transportation, Storage, and Distribution Managers	High school diploma or equivalent	5 years or more	None	34.5%
Logisticians	Bachelor's degree	None	None	38.8%
Aircraft Mechanics and Service Technicians	Postsecondary nondegree award	None	None	60%
Painters, Transportation Equipment	High school diploma or equivalent	None	Moderate-term	27.1%
Commercial Pilots	High school diploma or equivalent	None	Moderate-term	20.5%
Transportation Attendants, Except Flight Attendants	High school diploma or equivalent	None	Short-term	35.6%
Cargo and Freight Agents	High school diploma or equivalent	None	Short-term	46%
Transportation Inspectors	High school diploma or equivalent	None	Moderate-term	46.7%

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Railroad Conductors and Yardmasters	High school diploma or equivalent	None	Moderate-term	48.4%
Airline Pilots, Copilots, and Flight Engineers	Bachelor's degree	Less than 5 years	Moderate-term	20.5%
Rail Car Repairers	High school diploma or equivalent	None	Long-term	37%
Locomotive Engineers	High school diploma or equivalent	Less than 5 years	Moderate-term	48.2%
Captains, Mates, and Pilots of Water Vessels	Postsecondary nondegree award	Less than 5 years	None	35.7%
Sailors and Marine Oilers	No formal educational credential	None	Moderate-term	27%

#### Exhibit 11B: Mechanics and welding educational attainment

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Automotive Service Technicians and Mechanics	Postsecondary nondegree award	None	Short-term	33.4%
Welders, Cutters, Solderers, and Brazers	High school diploma or equivalent	None	Moderate-term	28.2%
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Less than 5 years	None	42.9%
Bus and Truck Mechanics and Diesel Engine Specialists	High school diploma or equivalent	None	Long-term	34.8%
Machinists	High school diploma or equivalent	None	Long-term	38.8%
Mobile Heavy Equipment Mechanics, Except Engines	High school diploma or equivalent	None	Long-term	37%
Farm Equipment Mechanics and Service Technicians	High school diploma or equivalent	None	Long-term	37%
Automotive Body and Related Repairers	High school diploma or equivalent	None	Long-term	26.1%
Structural Metal Fabricators and Fitters	High school diploma or equivalent	None	Moderate-term	34.7%
Automotive Glass Installers and Repairers	High school diploma or equivalent	None	Moderate-term	23.1%
Outdoor Power Equipment and Other Small Engine Mechanics	High school diploma or equivalent	None	Moderate-term	34.5%
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	28.2%
Electric Motor, Power Tool, and Related Repairers	High school diploma or equivalent	Less than 5 years	Moderate-term	42%
Recreational Vehicle Service Technicians	High school diploma or equivalent	None	Long-term	21.8%
Electronic Home Entertainment Equipment Installers and Repairers	Postsecondary nondegree award	None	Short-term	46.6%
Electronic Equipment Installers and Repairers, Motor Vehicles	High school diploma or equivalent	None	Moderate-term	38.5%
Electrical and Electronics Installers and Repairers, Transportation Equipment	Postsecondary nondegree award	None	Long-term	56.8%

**Exhibit 12B: Protective services educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Correctional Officers and Jailers	High school diploma or equivalent	None	Moderate-term	52.4%
Police and Sheriff's Patrol Officers	High school diploma or equivalent	None	Moderate-term	51.6%
Protective Service Workers, All Other	High school diploma or equivalent	None	Short-term	36.4%
Firefighters	Postsecondary nondegree award	None	Long-term	63.6%
Police, Fire, and Ambulance Dispatchers	High school diploma or equivalent	None	Moderate-term	47.6%
First-Line Supervisors of Correctional Officers	High school diploma or equivalent	Less than 5 years	None	46.3%
Private Detectives and Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	32.1%
Detectives and Criminal Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	35.2%
First-Line Supervisors of Police and Detectives	High school diploma or equivalent	Less than 5 years	Moderate-term	43.4%
First-Line Supervisors of Protective Service Workers, All Other	High school diploma or equivalent	Less than 5 years	None	43.1%
First-Line Supervisors of Fire Fighting and Prevention Workers	Postsecondary nondegree award	Less than 5 years	Moderate-term	59.2%
Gaming Surveillance Officers and Gaming Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	42.7%
Animal Control Workers	High school diploma or equivalent	None	Moderate-term	40.5%
Forensic Science Technicians	Bachelor's degree	None	Moderate-term	33.9%

**Exhibit 13B: Retail educational attainment**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Interior Designers	Bachelor's degree	None	None	30.3%
Security and Fire Alarm Systems Installers	High school diploma or equivalent	None	Moderate-term	47.2%
Morticians, Undertakers, and Funeral Directors	Associate degree	None	Long-term	56.3%
Locksmiths and Safe Repairers	High school diploma or equivalent	None	Long-term	36.9%
Advertising Sales Agents	High school diploma or equivalent	None	Moderate-term	30.1%
First-Line Supervisors of Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	38.1%
First-Line Supervisors of Personal Service Workers	High school diploma or equivalent	Less than 5 years	None	37.6%
Home Appliance Repairers	High school diploma or equivalent	None	Moderate-term	37.6%
Customer Service Representatives	High school diploma or equivalent	None	Short-term	43.7%
Skincare Specialists	Postsecondary nondegree award	None	None	30.2%

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
First-Line Supervisors of Gaming Workers	High school diploma or equivalent	Less than 5 years	None	45.4%
Hairdressers, Hairstylists, and Cosmetologists	Postsecondary nondegree award	None	None	41.6%
Merchandise Displayers and Window Trimmers	High school diploma or equivalent	None	Short-term	30.3%
Demonstrators and Product Promoters	No formal educational credential	None	Short-term	36.4%
Funeral Attendants	High school diploma or equivalent	None	Short-term	51.9%
Floral Designers	High school diploma or equivalent	None	Moderate-term	30.3%
Manicurists and Pedicurists	Postsecondary nondegree award	None	None	30.2%
Barbers	Postsecondary nondegree award	None	None	34%